FEBRUARY 14, 1955

the OIL AND GAS JOURNAL

Oil-Hungry PACIFIC NORTHWEST *Gets Refineries And Pipelines*

- They're Calling It "Bedlam Beach" in California . 70
- More Oil for Less Discovery Money . . . Via Improved Geophysics . 76

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DID YOU SAY YOUR CONDITIONS WERE DIFFERENT?

BOC
Valve, Hookwall Type Packers
38 sizes

BOCL
Valve, Hookwall Type Long Stroke Valve Packers
38 sizes

BOE and BOEL
Valve, Hookwall Type Packers (Extra Heavy-Duty Testing)
19 sizes of each

BOCU
Valve, Anchor Type Packers
38 sizes

AO
Valveless Hookwall Type Packers
43 sizes

AOF
Valveless Hookwall Type Packers (Full Opening Mandrel)
4 sizes

BOCI
Valve, Hookwall Type Packers (Inverted Setting)
13 sizes

Series 3
Formation Packers (Valveless, Anchor Type, Sleeve Packing Element)
21 sizes

Series 4
Formation Packers (Valve, Anchor Type Sleeve Packing Element)
21 sizes

OO
Valveless, Hookwall Type Packers (Thin Wall for Packoff between macaroni string and tubing, tubing and casing, or casing to casing)
22 sizes

287

SD
Valveless, Anchor Type Packers (Thin Wall for use where clearance is too small to allow a hookwall packer)
30 sizes

no matter what your job, one of these 287 packers is tailor-made to give you leak-proof packoff, to run in easily and to pull without trouble.

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PAGE 1 ONE . . . *a glance ahead*

Dual completions look more attractive with new West Texas method of running two tubing strings side by side, hanging free of each other. Method keeps artificial-lift systems on two zones separate and simple.

Gas industry hasn't yet agreed on draft of bill to exempt producers from federal control and isn't formally supporting any bill so far introduced. Both industry and FPC are reluctant to take specific stand until White House releases cabinet-study report.

Resources policy report of Eisenhower cabinet committee is being delayed by dissension over oil imports. Some White House advisers want whole report held up until Congress completes action on extension of reciprocal trade law.

Plastics will make a strong bid to displace coal-tar and asphalt for external coatings on pipelines. One current experiment promises two coats of liquid and one of plastic tape, applied by conventional equipment, totaling one-fifth the thickness of usual coatings and at competitive cost.

European capital is seriously studying ways to use natural gas now wasted in Middle East oil fields. One study indicates liquefied gas could be delivered to England in tankers at about cost of manufactured gas and having twice its B.t.u. value.

Whether or not Bureau of Mines discontinues its shale-oil experiments, at least two oil companies will go ahead with pilot-plant work, with particular emphasis on shale's gas yield. Outlook for rising demand and prices for gas make shale more attractive than when chief products appeared to be low-quality liquids.

The growing Arizona market is becoming a prize worth fighting for. At least two independents have schemes for a refinery at Phoenix, and four West Coast majors are studying a products pipeline to serve this area now supplied by rail and truck.

One major oil company is planning a long-range petrochemical expansion program in the Texas-Louisiana area, designed eventually to tie refineries into a complex of plants processing feed stocks, intermediates, and finished chemicals.

the OIL AND GAS JOURNAL

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OIL AND GAS PIPELINES • REFINING • PETROCHEMICALS

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TECHNOLOGY — OPERATION

The New Badger Pipeline 94

By R. G. Deering

The new Badger pipeline system probably has more right-of-way through urban territory than any other system in the country. The 267-mile products line starts in East Chicago, Ind., and ends at Madison, Wis. The line has 260 crossings. Over 75 miles of the system are laid in highway, railroad, city street, or canal right-of-way.

Complete Gas Wells Safely 97

By D. D. Jackson

Basic danger in completion of gas wells is explosion or fire resulting from leakage of high-pressure formation fluid. Primary precaution to be taken is the prevention of leaks. Special attention should be given to possible blowouts. The closing operation must be simple and quick to perform.

Precautions to Prevent Blowouts 100

By George W. McCray

Blowouts are dangerous, expensive accidents and most of them are caused by failure to follow good established practices. Almost any blowout costs more than it costs to furnish proper protection. The precautions listed in the article should therefore be followed to the letter.

Cut Field Compressor Costs 103

By F. Lawrence Rosen

In the western division of The California Co. at Rangely field, Colorado, preventive maintenance is being used successfully to reduce costs. The company maintains high operating efficiency and avoids unscheduled shutdowns on its field compressors.

The Fluid-Operated Valve 105

By W. B. Adair

This new tool for gas lift offers several possible advantages over the conventional pressure-operated valve.

Pacific Northwest Special Section 107-122

New Refineries and Pipelines 108

By D. H. Stormont

As a result of new refineries, pipelines, and other projects, the fuel-supply patterns are changing in the Pacific Northwest. Crude and products from California, Canada, the Rocky Mountain area, Middle East, and Venezuela are in competition for the market.

Washington's First Major Refinery 113

By D. H. Stormont

General Petroleum's Ferndale plant has 35,000 bbl. capacity. It is featured by a high degree of integration. Intermediate rundown tankage is reduced to a minimum and maximum use is made of heat interchange.

Staffing a New Refinery 118

General Petroleum recruiting staff from Olean, N. Y., and Torrance, Calif. refineries; get by with minimum on-the-job training.

New British Columbia Refinery 121

A new thoroughly modern 11,000-bbl. refinery at North Burnaby gets maximum yields of high-grade motor fuels and light burning oils.

Pipeline Patrol 143

This final article in a four-part series on the free-piston gas turbine speculates on future uses of the machine. Also, how to save money by reworking old tractor parts.

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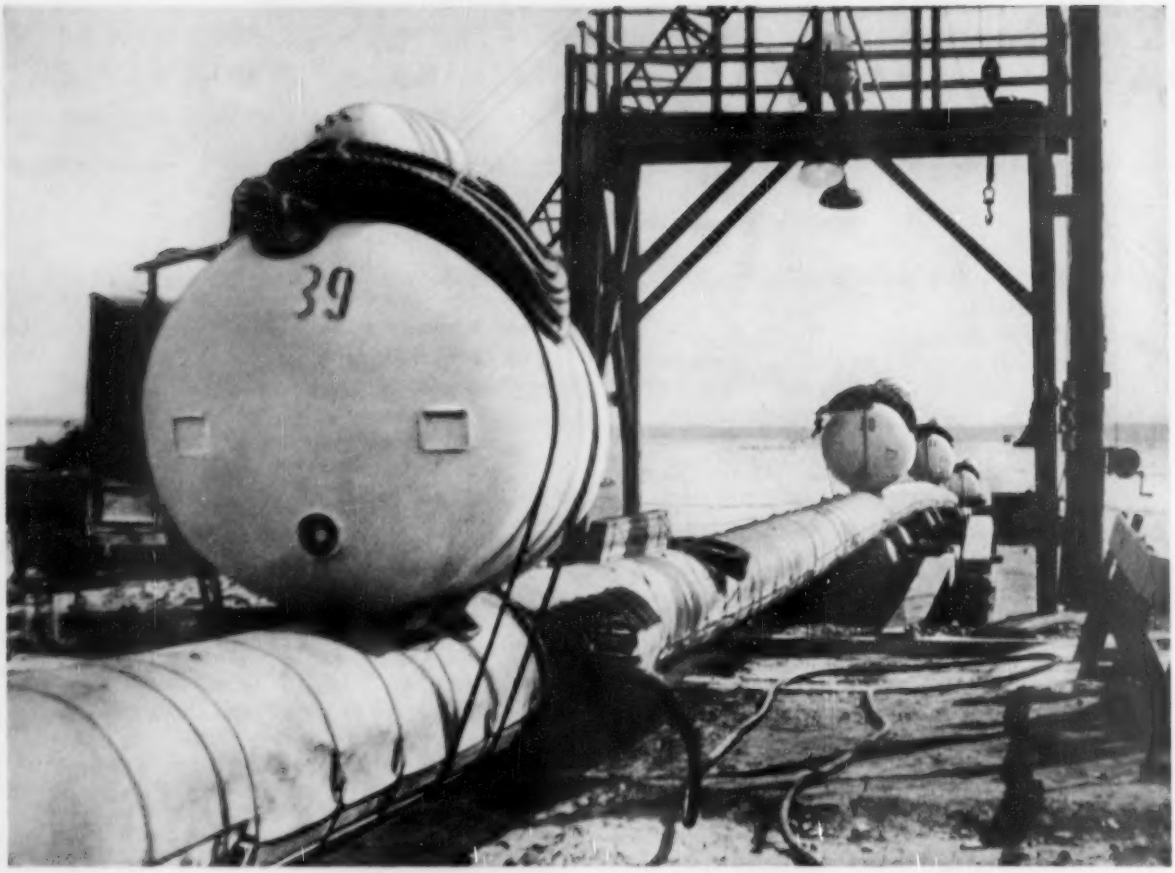

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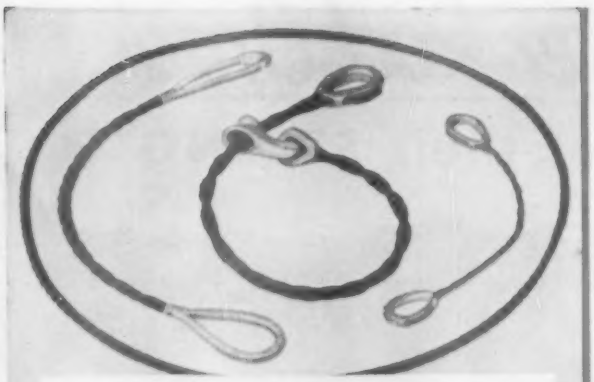

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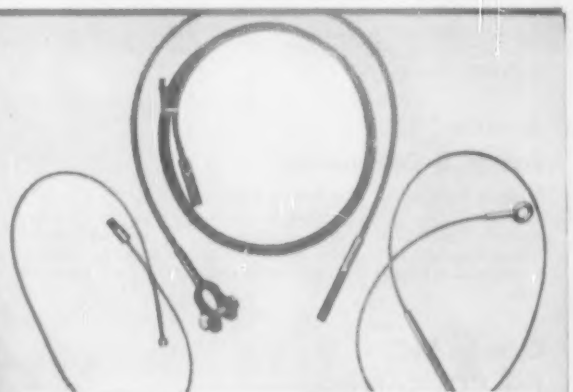

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Grade "T" for H_2S Corrosion — 3

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Grade "N" for Non-Corrosion or Inhibited — 5

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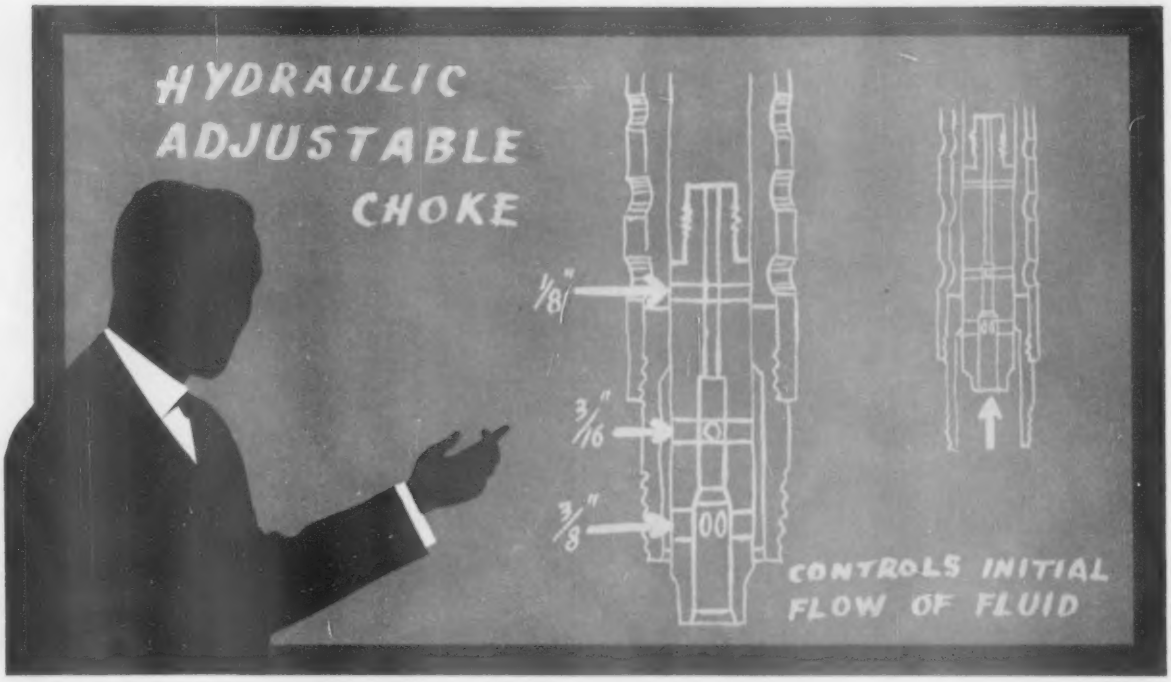

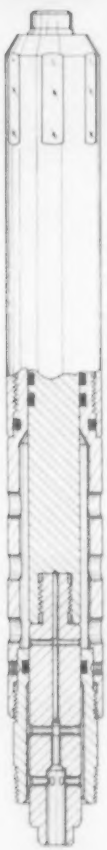

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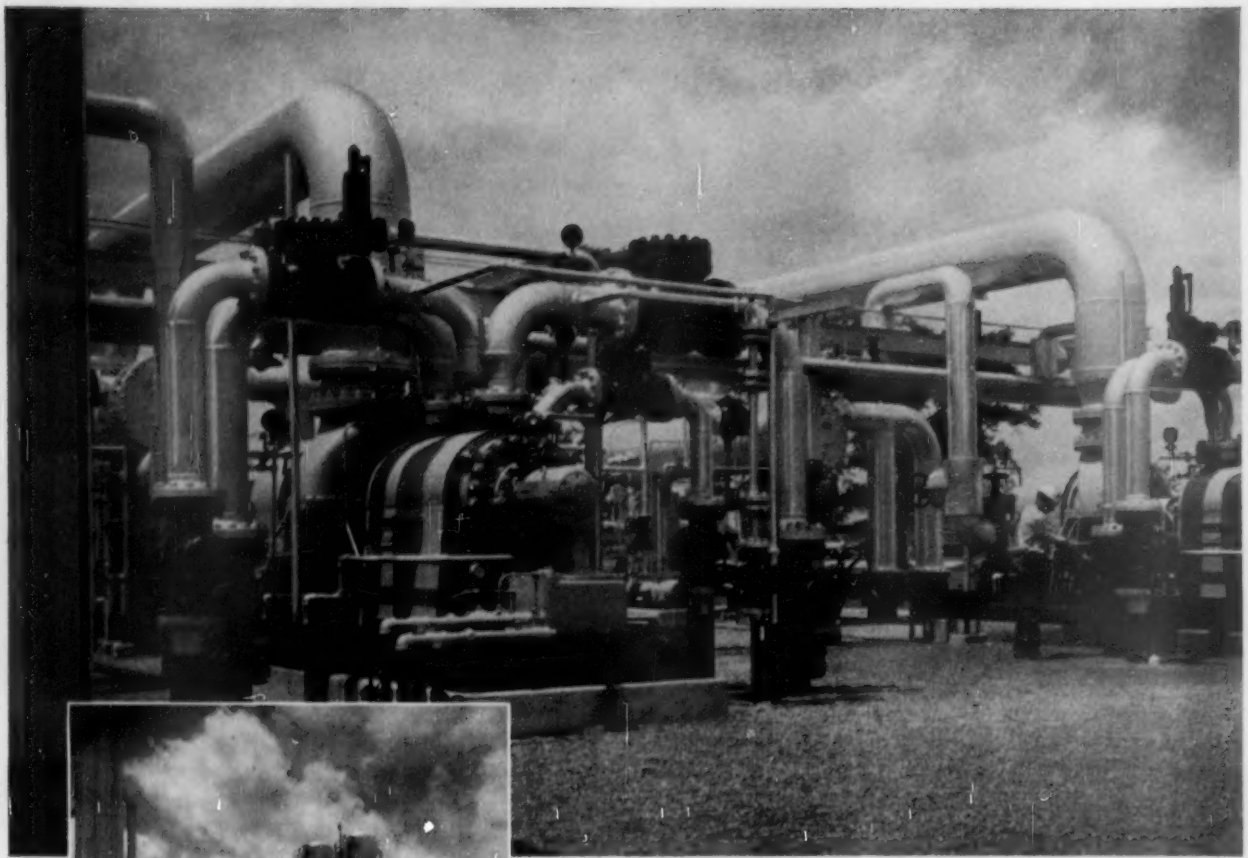

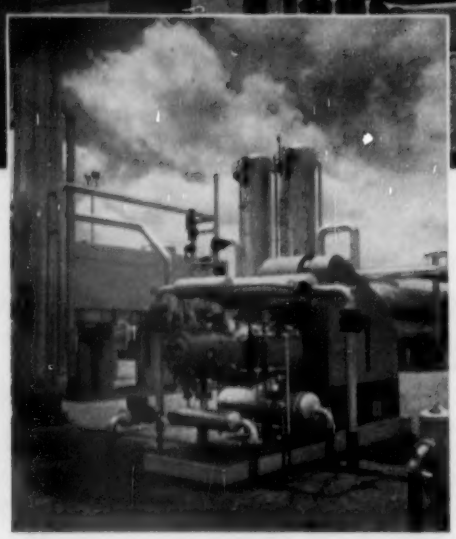

Each of these seven-stage Class CHTB I-R pumps is on lean oil service discharging to absorbers at three pressure levels: 400, 700 and 1450 PSIG. Note the neat arrangement of three sets of discharge lines.

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Ingersoll-Rand SFLA pumps, with integral mechanical shaft seal, on reflux service.

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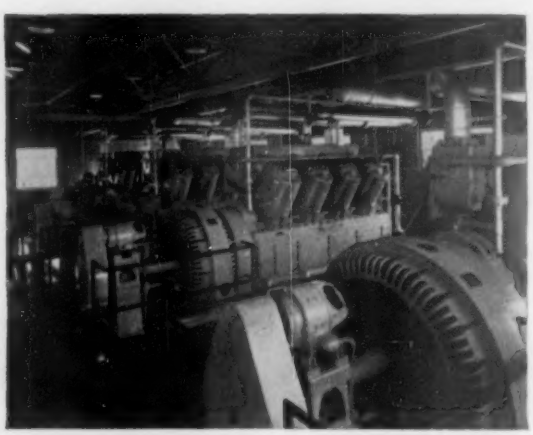

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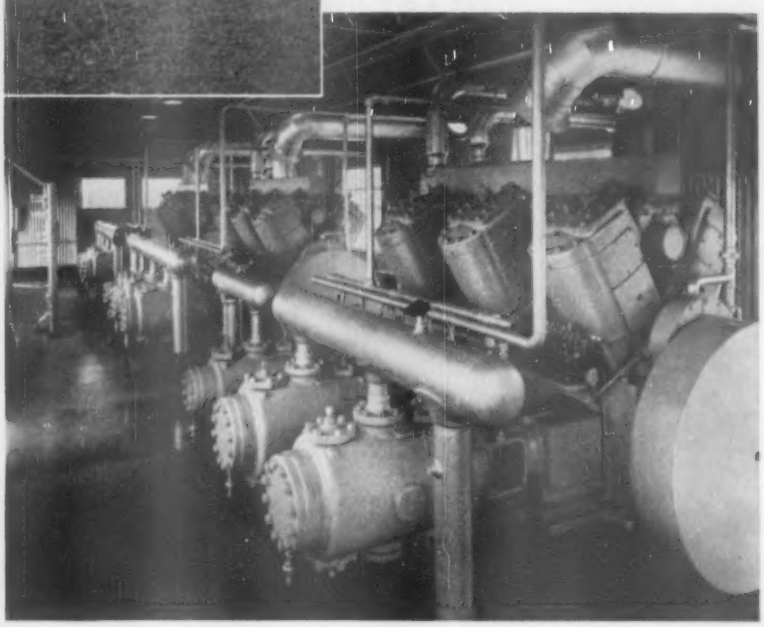

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Northern Natural achieves billion cu. ft. daily line capacity... builds with A. O. SMITH LINE PIPE

Northern Natural Gas Company this year completes its expanded two-year construction program, with total daily pipe line capacity up to 1,100,000,000 cu. ft. 460 miles of new main line loops were laid in the two-year program, with twelve sections of loop line being laid each year. New line facilities bring natural gas to 71 additional communities in Iowa, Nebraska, Minnesota and South Dakota . . . so that the company now serves a total of 307 communities in the Northern Plains.

A. O. Smith's participation in the job consisted of 178 miles of 30-inch pipe and 60 miles of 20-inch pipe.

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LINE 187 STRAINERS

Bottom Outlet Type

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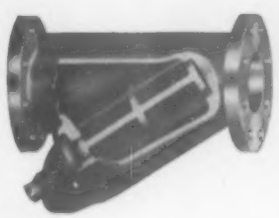
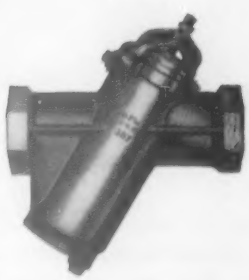
Be sure! Use OPW Line Strainers for a contamination free product. Tight fit of cage and screen assures all product passing through strainer. Screen areas are many times pipe size for full flow. The simplicity of screen removal, cleaning and replacing, facilitates regular, periodic checkup in the shortest possible time.

Choose your size, type and mesh! 125-pound standard or 200-pound high pressure types. Bottom or top outlet cage, reinforced for sturdiness and precision-fit. Screwed or flanged end. Flanges, bolts and gaskets to suit. Strainer meshes from 14 to 300.



No. 187-F

Bottom opening type. Heavy cast iron body, 125 pound. Furnished with 40 mesh bronze cage, reinforced screen for gasoline, 14 mesh brass screen for fuel oil.



No. 387

Top outlet type. 125 pound. Heavy ribbed iron body has tapped plug in top section for air relief connection, also bottom drain plug. Both drilled for seal wires.

No. 487-F

Top outlet type 200 pound flanged, drilled and faced on pipe ends with bolted, gasketed cap.

No. 387-F

Top outlet type cage, perfect for pit application. 125 pound flanged, drilled and faced. Cap can be seal wired to prevent tampering.

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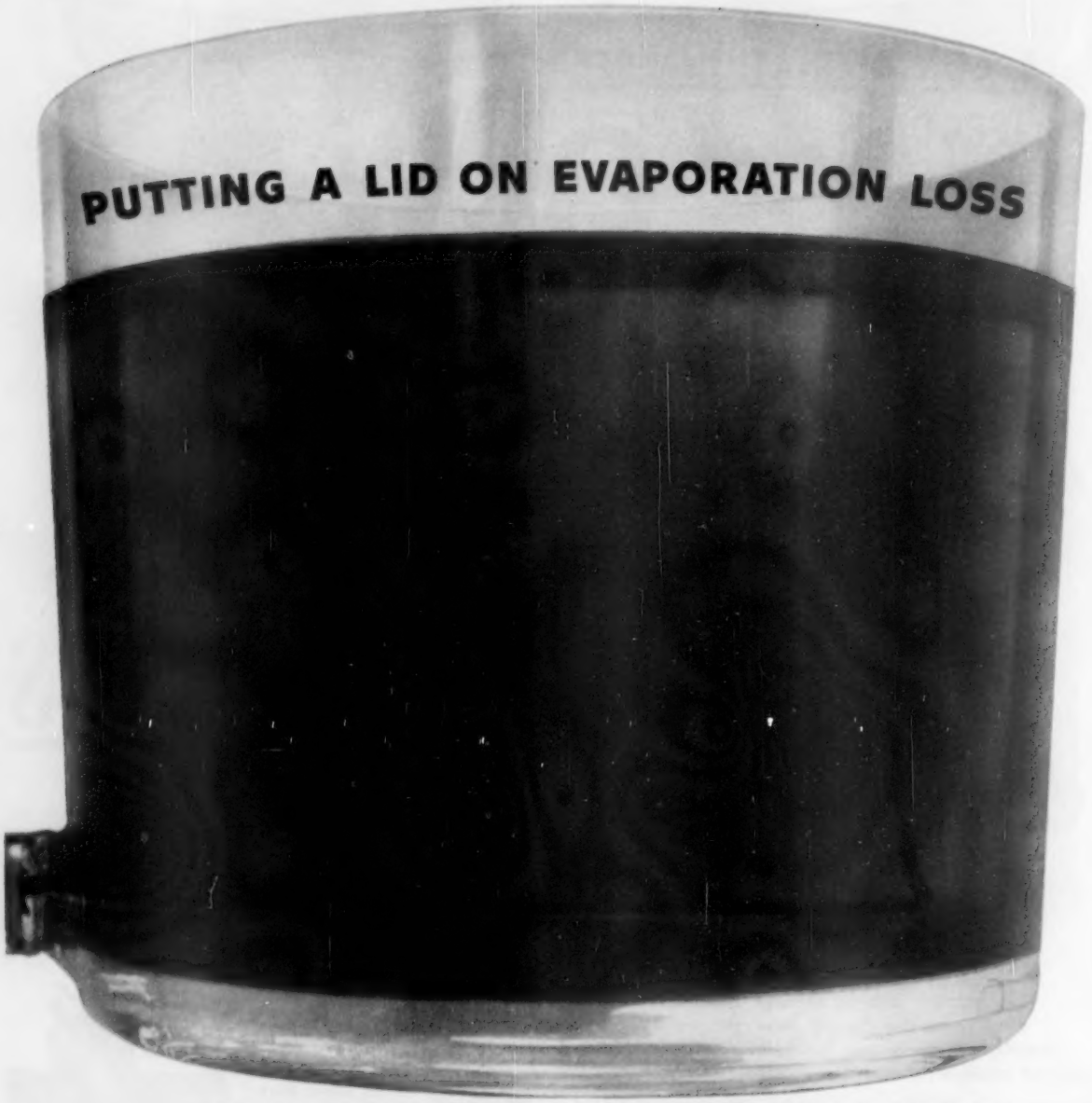
PUTTING A LID ON EVAPORATION LOSS



Photograph of laboratory installation shows how hollow spheres of BAKELITE Phenolic Resin float directly to oil surface in storage tanks. They're mixed with oil and pumped through tube entering at left. Field installation would show more roiling as a result of pumping pressure.

A half-inch layer of Microballoon* spheres, floating on the crude-oil surface in a cone-roofed storage tank, can cut evaporation 80%. That's a saving of 750 barrels a year in an 88-foot diameter tank. It can write off the installation cost in the first twelve months.

These microscopic hollow spheres of BAKELITE Phenolic Resins resemble reddish-brown, finely-ground flour in bulk. Pumped into the tank with the oil, they float to the surface in a matter of minutes. Since they're non-abrading, they won't harm pipe lines or pumping equipment. The blanket they form fits snugly against tank sides and internal supports, sealing the surface, rising and lowering with the oil level.

Start now to put the lid on costly evaporation loss. Write for information to Dept. AN-64.

*Trade-mark of The Standard Oil Company (Ohio)

BAKELITE BRAND Phenolic Resins

BAKELITE COMPANY, *A Division of Union Carbide and Carbon Corporation* UCC 30 East 42nd Street, New York 17, N.Y.

In Canada: Bakelite Company, Division of Union Carbide Canada Limited, Belleville, Ontario

The term BAKELITE and the Trefoil symbol are registered trade-marks of U.C.C.

USE *Copon*... our revolutionary EPON® RESIN COATING

for POSITIVE PROTECTION of TANK AND PIPE INTERIORS

Here are the reasons why "Copon" is attracting the attention of leading corrosion and petroleum engineers:

- It has exceptional tenacity, will adhere to metal surfaces longer and under more difficult conditions than any other coating yet tested.
- It is abrasion-resistant and has proven low erosion rate.
- It gives positive protection against rust and corrosion, also the chemical effects of crude oil, natural gas and salt water.
- It has amazing flexibility and elasticity.
- It provides a silky smooth, even surface that increases line flow by reducing friction.
- It is easy to apply by spray, brush or pig method.

CPL

COAST Paint & Lacquer Co. Inc.

P. O. BOX 1113 • HOUSTON, TEXAS

JENKINS REGRIND-RENEW PLUG TYPE VALVES WITH

500 BRINELL *Armor Seat*

Armored against valve-killing close control of steam . . . and abrasion

Plug and seat ring are Jenkins JX500, a stainless chromium alloy steel made to Jenkins high strength specifications, heat-treated to 500 Brinell hardness. Seating surfaces are super-hard and mirror-smooth, offer highest resistance to galling, cutting, abrasion, and erosion . . . and "wire drawing" effects of close regulation of steam.

300 lb. 200 lb. 150 lb.
Globe and Angle

SOLD THROUGH LEADING DISTRIBUTORS

Call your Jenkins Valve Distributor, and ask for Form 202, or write: Jenkins Bros., 100 Park Avenue, New York 17.

JENKINS VALVES

LOOK FOR THE JENKINS DIAMOND

Jenkins Bros

This task force at Solar's Des Moines plant is studying a complex diffuser assembly, on which Solar is working both in stainless steel and titanium. Clockwise are Charlie Ragan, assistant contracts manager; Bill Dixon, chief production engineer; Bob Ballard, manager of manufacturing; Ed Gunton, assistant plant manager—operations; Bill Schilling, chief design engineer, and Hi Brown, chief metallurgist.

A Solar Task Force can help you solve special problems

IN EVERY NEW SOLAR PROJECT, the first step is the formation of a project task force. The requirements of the new job are studied and the engineering and shop skills demanded by it are noted. Next, individual engineers and specialists in these fields are selected from Solar's many departments, from research through production.

These men, as a team, are charged with full responsibility for the successful completion of their project. Each task force team is free to call for additional specialists whenever they are needed.

Through this task force system, each project – large or small – benefits from *all* of Solar's knowledge and 27 years' experience in designing and building heat resistant alloy products. The task force system has resulted in many important design improvements, as well as impressive savings in production costs.

Solar will be happy to assign a task force team to help *you* solve special problems.

SOLAR AIRCRAFT COMPANY — SAN DIEGO, DES MOINES

DESIGNERS, DEVELOPERS AND MANUFACTURERS OF METAL ALLOY PRODUCTS

This is What Solar Offers You

Solar specializes in the manufacture of precision products from alloys and special metals for severe service. Solar's experience since 1927 is unduplicated in this field. Solar skills and facilities range from research, design and development through to mass production. Wherever heat, corrosion or difficult specifications are problems, Solar can help you solve them.

PLANTS. *In San Diego and Des Moines (photograph above). A total of 1,400,000 sq ft of floor space. Approximately 5,000 employees. Annual sales over $65,000,000.*

EQUIPMENT. *Production equipment for all types of metal fabrication —forming, machining, welding, brazing, casting, coating. Extensive laboratory and testing equipment. Facilities for development, prototype, limited or mass production.*

SERVICES. *Research, design, development, tooling and production engineering staffs. Experienced with all alloy steels, stainless alloys, super alloys, and titanium and its alloys. Government source inspection and Solar quality control meet rigid aircraft and commercial standards.*

CONTRACT PRODUCTION

Current orders include aircraft engine and airframe parts, alloy castings, pneumatic ducting, atomic energy components. Customers include some of the most honored names among aircraft and industrial companies in the U.S. and Europe.

SPECIAL PRODUCTS

Bellows. *"Sola-Flex"® bellows and expansion joints in many designs from ½ in. up to the world's largest, 28 ft in diameter.*

Gas Turbines. *Solar "Mars" 50 hp engines for auxiliary generator sets, ground carts, portable fire pumps; Solar "Jupiter" 500 hp engines in variable and constant speed models.*

Ceramic Coatings. *"Solaramic"® is the Solar trade mark for a family of coatings that protects metals from heat, corrosion, galling and abrasion.*

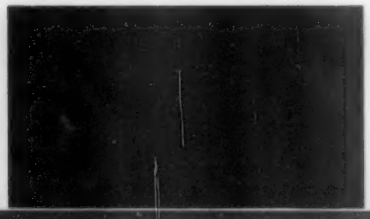
Controls. *Complete control systems utilizing the new Solar "Microjet"® principle for control of gas turbines, jet engines and pneumatic devices.*

FURTHER INFORMATION
Your inquiry regarding any Solar product or service will receive prompt attention. Address Solar Aircraft Company, Department A-72, San Diego 12, California

J&L PIPE

A.P.I.

CASING and TUBING



J&L makes casing and tubing to A.P.I. standards in a complete range of types, weights, and sizes.

The JONES & LAUGHLIN signature on each length indicates a product of superior quality, result of technical skill developed over a period of more than a century, and control of every process from mining the ore to the final finishing operation.

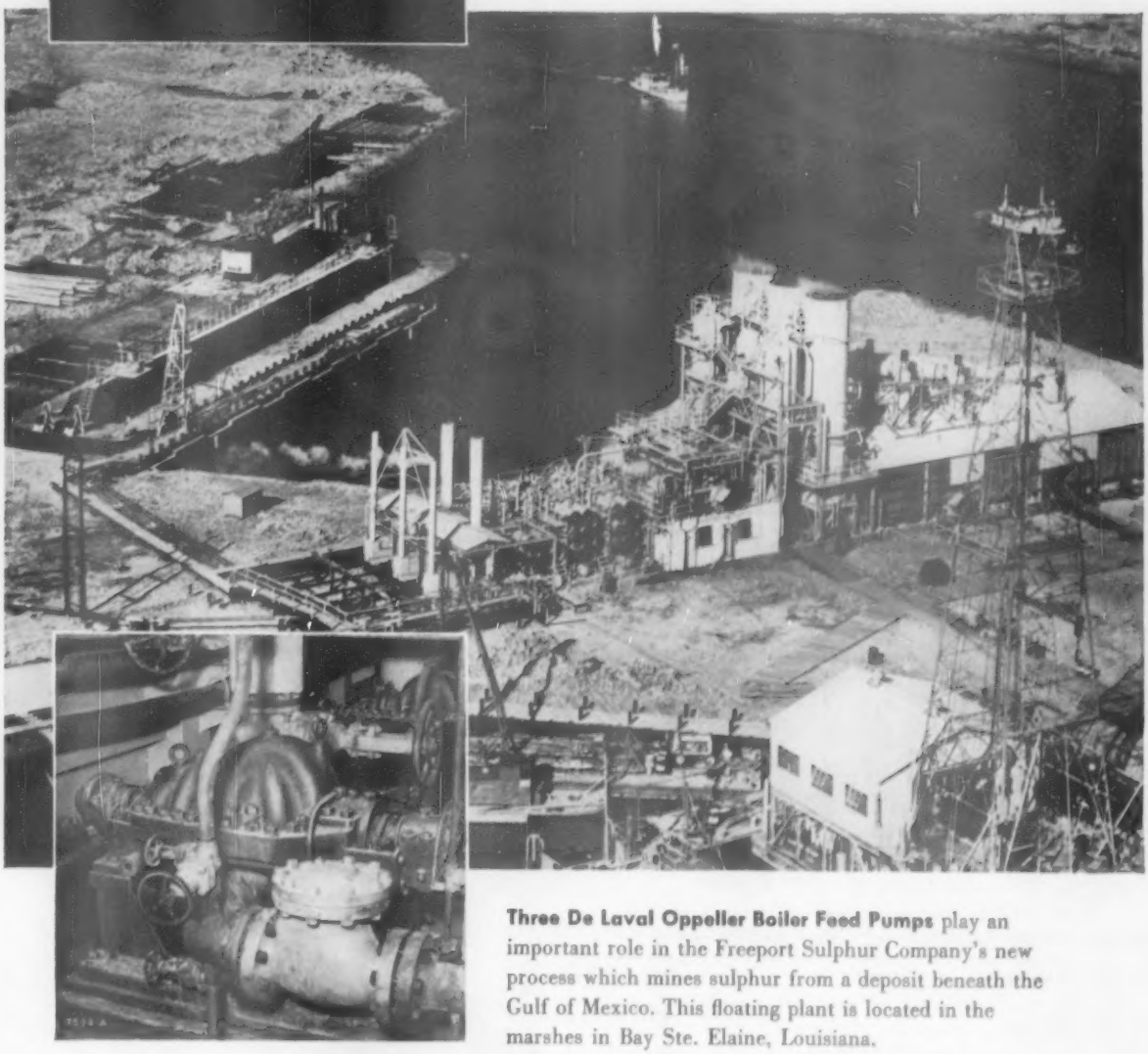
J&L men especially versed in pipe for the oil industry are stationed near you. Call your J&L store.

Jones & Laughlin
STEEL CORPORATION
SUPPLY DIVISION – TULSA, OKLAHOMA
Serving The United States and Canada

110-S

DE LAVAL
OPPELLER PUMPS

are used for boiler feed on floating process plant



Three De Laval Oppeller Boiler Feed Pumps play an important role in the Freeport Sulphur Company's new process which mines sulphur from a deposit beneath the Gulf of Mexico. This floating plant is located in the marshes in Bay Ste. Elaine, Louisiana.

The De Laval Boiler Feed Pumps operate at 3,500 rpm with water heated to 297F. They are built with 12% chrome steel impellers and trim. The dependable performance of these units has led Freeport Sulphur to purchase six additional pumps for boiler feed service at two other mines. In addition to boiler feed, De Laval Oppeller Pumps are used throughout industry for mine dewatering, descaling, desuperheater feed as well as for services in the petroleum, pipeline and marine fields. Capacities range up to 2,000 gpm, pressures to 1,200 psig, temperatures to 350F; materials to suit any service. For complete data, send for Catalog 1502.

DE LAVAL *Oppeller Pumps*

DE LAVAL STEAM TURBINE COMPANY

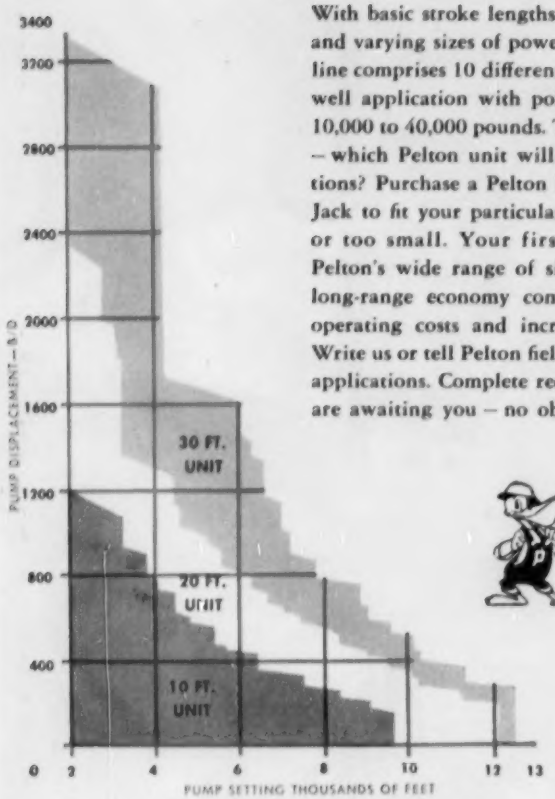
510 Nottingham Way, Trenton 2, New Jersey

DL-850

10 PELTON MODELS OFFER YOU WIDER SELECTION – ECONOMY

HYDRAULIC LONG STROKE PUMPING JACKS

With basic stroke lengths of 10, 20 and 30 feet and varying sizes of power cylinders, the Pelton line comprises 10 different models to handle any well application with polished rod loads from 10,000 to 40,000 pounds. Try the Selection Chart – which Pelton unit will suit your well conditions? Purchase a Pelton Long Stroke Pumping Jack to fit your particular need – not too large or too small. Your first economy comes in Pelton's wide range of sizes. Your second and long-range economy comes in vastly reduced operating costs and increased oil production. Write us or tell Pelton field men about your well applications. Complete recommendations, prices are awaiting you – no obligation whatever.

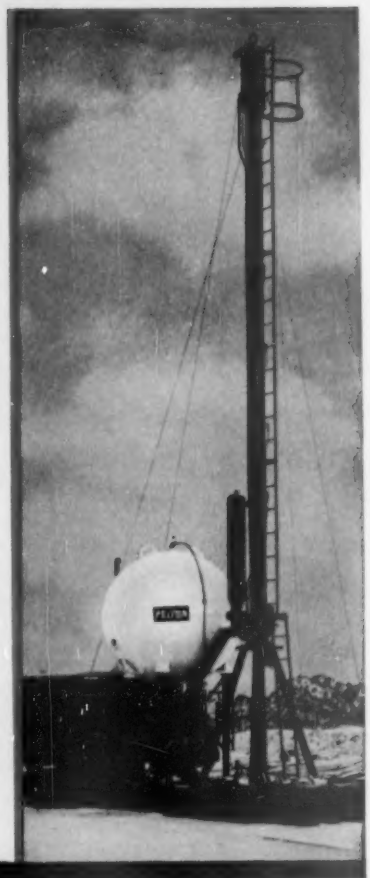


HOW TO USE THE SELECTION CHART

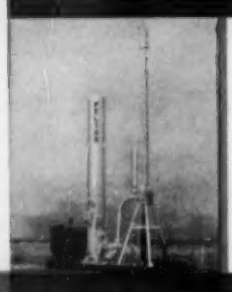
EXAMPLE: Well depth 8000 feet. Desired pump displacement 500 B/D. A Pelton 20-foot stroke unit will do the job. THE ABOVE SELECTION CHART BASED ON:

1. Fluid – all water
2. Fluid at pump
3. Tubing anchored
4. Limit of 40,000 PSI stress in sucker rods
5. Maximum sucker rod size 1"

PELTON is the leading manufacturer of Hydraulic Long Stroke Pumping Equipment.



Series HP 30 Ft. Stroke Jack



Series GP
20 Ft. Stroke Jack

Series FP
10 Ft.
Stroke Jack

PELTON
WATER WHEEL COMPANY
Subsidiary of Baldwin-Lima-Hamilton Corp.
Oil Industry Machinery Division
1447 East 64th Street, Los Angeles 58, California

What makes the MICROLOG different?

Note the hemispheres of influence of the two MicroLog curves. The short spacings and insulating pad make it possible to measure a minimum of formation together with evidence of mud cake development. The resulting log is very detailed, indicating permeable zones and offering a means of measuring porosity. MicroLogging . . . another example of Schlumberger's determination and ability to create unique new ways of obtaining vital formation data . . . has been acknowledged as the most important development in well logging since Schlumberger pioneered the basic electrical log. Your Schlumberger engineer can help you determine the formations and conditions in which the MicroLog may prevent you from passing up production possibilities. Be sure on every survey.

THE EYES OF THE OIL INDUSTRY

SCHLUMBERGER

Well Surveying Corporation

The measurable advantages of Ross specially engineered exchangers

1 Thirty-five years of accumulated engineering experience qualify Kewanee-Ross to solve *your* heat exchanger problems readily, no matter how highly specialized they are.

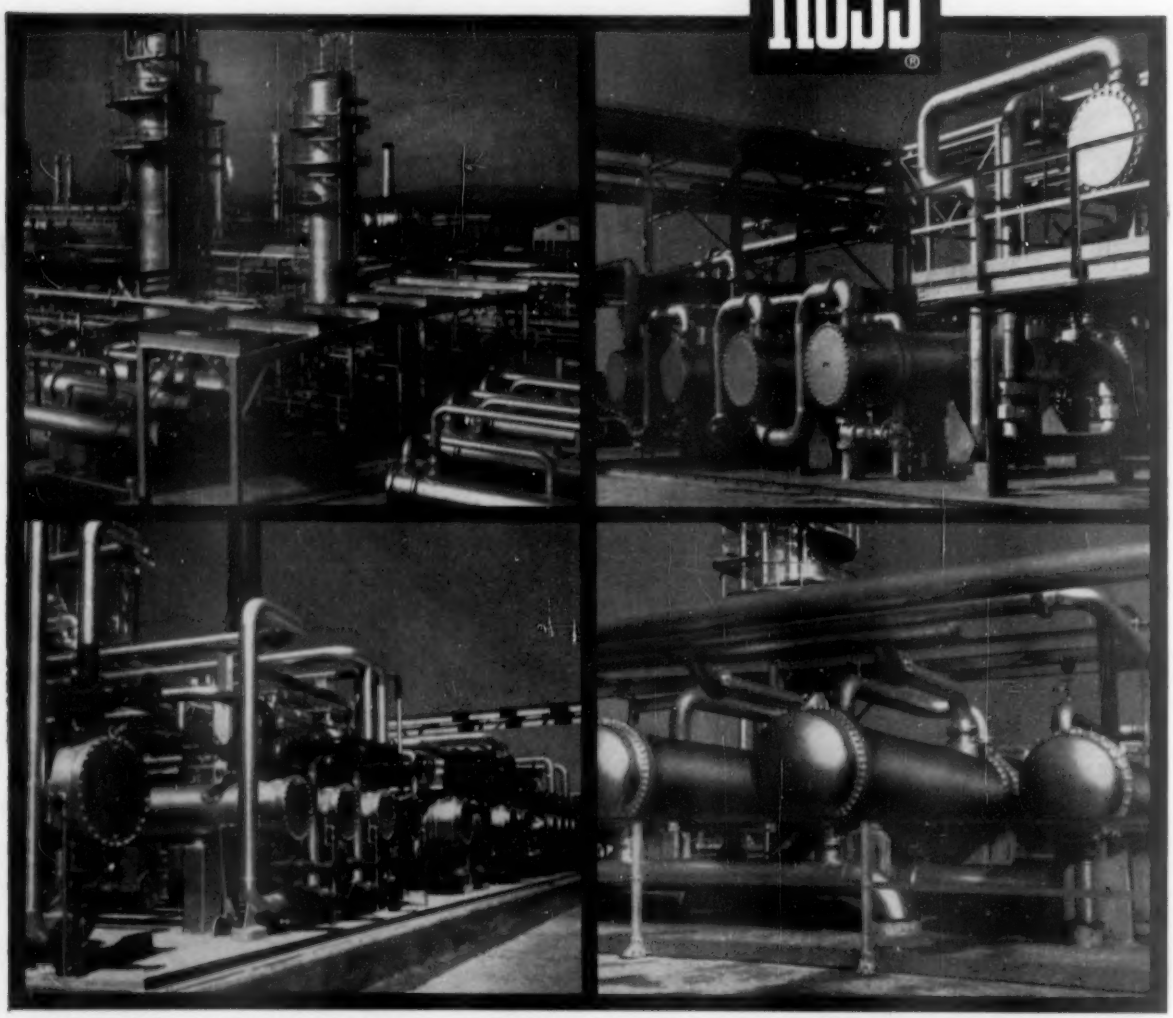
2 Comprehensive standardization makes available a large selection of flanges, shell and floating head covers, tube sheets, tube layouts, shell and channel sizes and other components in a wide range of working pressure to meet most requirements.

3 Capacity for special exchanger production has been measurably increased with the addition of another large plant at Kewanee, Illinois. Favorable delivery promises can be made — *and kept.*

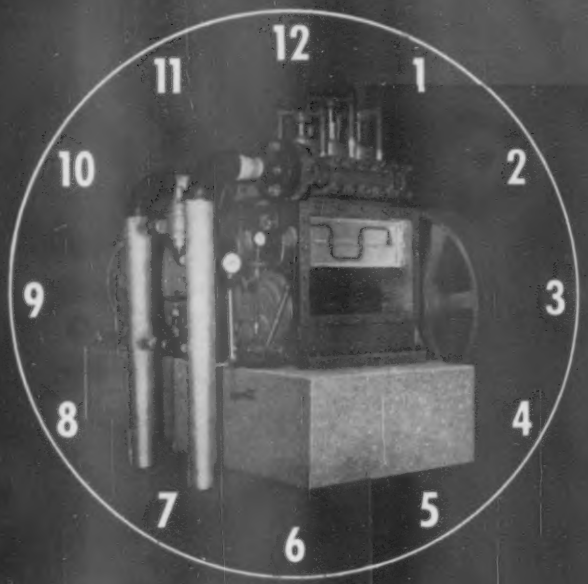
Why not arrange for consultation with the Ross exchanger representative nearest you? You will find him both competent and cooperative.

KEWANEE-ROSS CORPORATION
DIVISION OF AMERICAN RADIATOR & STANDARD SANITARY CORPORATION
1417 WEST AVENUE • BUFFALO 13, N. Y.
In Canada: Kewanee-Ross of Canada Limited, Toronto 5, Ont.

ROSS®



Serving home and industry: AMERICAN STANDARD • AMERICAN BLOWER • CHURCH SEATS & WALL TILE • DETROIT CONTROLS • KEWANEE BOILERS • ROSS EXCHANGERS • SUNBEAM AIR CONDITIONERS

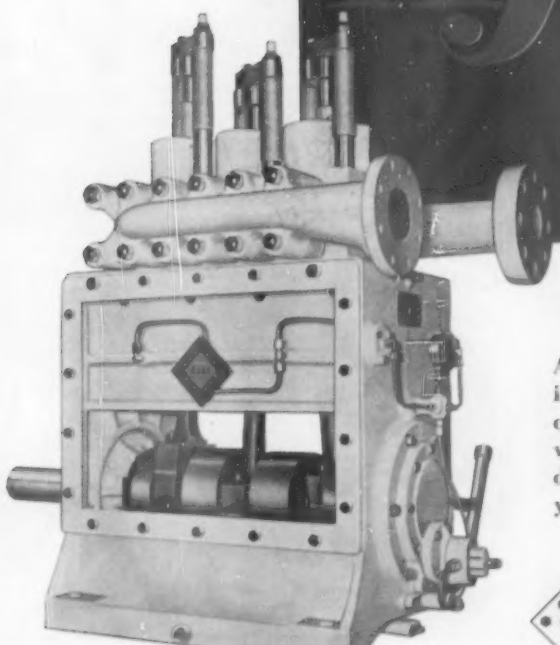


For CONSTANT PRESSURE

INSTALL AN

Ajax PUMP

TP-4000 SERIES



IN YOUR RECOVERY OPERATION

Ability to maintain pressure in water-flooding is vital to efficient oil recovery at minimum costs. You get this dependable performance with the Ajax TP-4000 Pump because it is designed and built with your needs as the yardstick—by the makers of Ajax Engines with a worldwide reputation for reliability. ● Get the Ajax Pump facts—and you'll buy an Ajax Pump! *Write us for descriptive Bulletin 531 - - - see your Supply Man!*

AJAX

PESA

AJAX IRON WORKS

Builders of GAS AND OIL ENGINES, PRESSURE PUMPS,
STEAM DRILLING ENGINES, INDUSTRIAL STEAM ENGINES

CORRY, PENNSYLVANIA

Oil Field Distributors: THE NATIONAL SUPPLY CO., PITTSBURGH, PA.
R. B. MOORE SUPPLY CO., BOLIVAR, N.Y. - BETHLEHEM SUPPLY CO., TULSA, OKLAHOMA

AVAILABLE JOHNSTON by AL CAPP

STOP!!
IT'S CROOL T' STUFF THAT CRITTER IN A HOLE!!
WE HEARS CATS' WHISKERS MEASURES OIL-WELL INSIDES!!-
Al Capp
NO!!-YOU HEARD THE JOHNSTON HYDRAULIC HOLE CALIPER IS THE CAT'S WHISKERS, FOR CHARTING BORE-HOLE DIAMETERS!!
IT LOGS SUB-SURFACE FORMATIONS, TO GIVE AN ACCURATE PROFILE-
SPEAKIN' O' PROFILES, YO' JOHNSTON BOYS GOT MIGHTY HAN'SOME ONES!!-
SORRY!!-WE GOTTA LOG A WELL, WIF THAT CALIPER THAT SAVES RIG-TIME!!

C 5411

Copr. Capp Enterprises 1954

JOHNSTON TESTERS

first in drill stem testing

HOUSTON, TEXAS

LOS ANGELES, CALIF. • CALGARY, CAN.

FORMATION AND CASING TESTING — JOHNSTON

Oil Field Distributors: THE NATIONAL SUPPLY CO., PITTSBURGH, PA.
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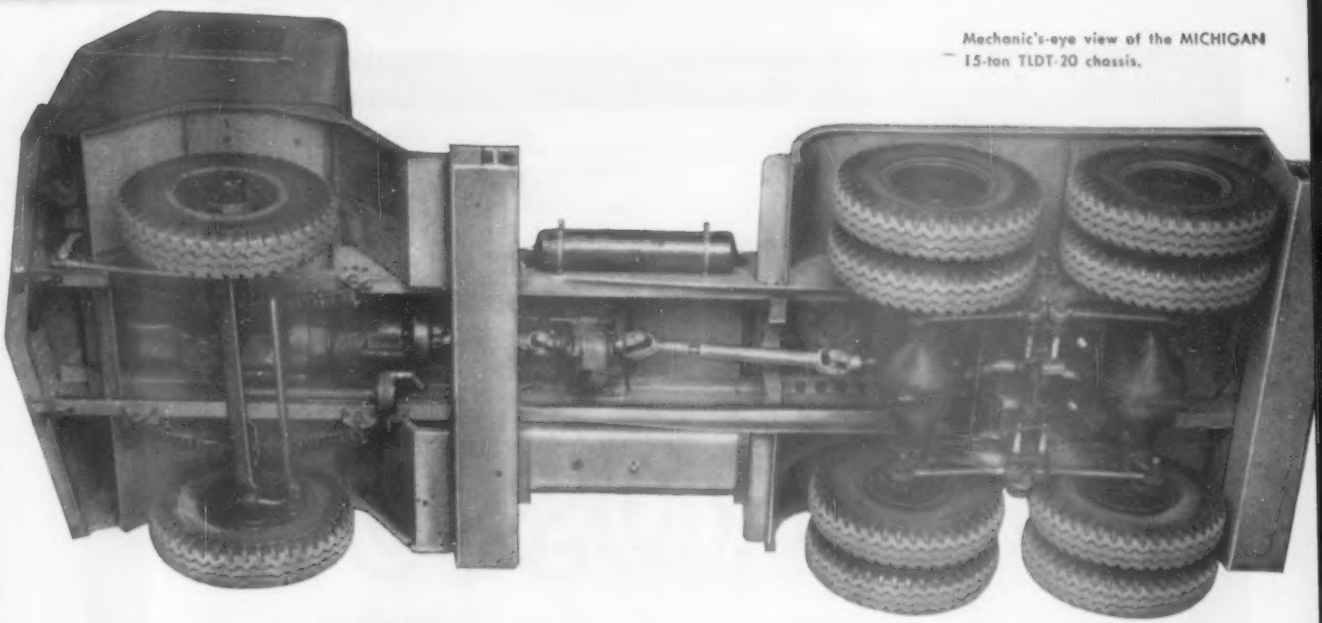
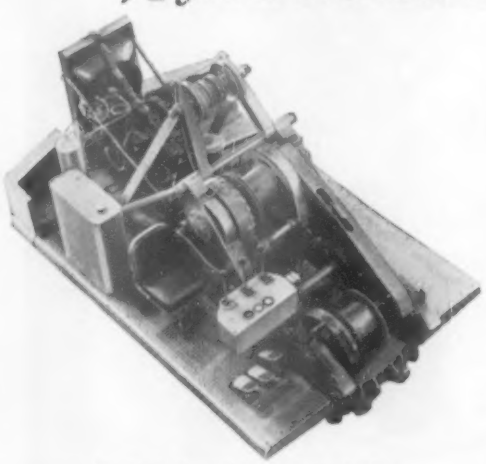


Mechanic's-eye view of the MICHIGAN 15-ton TLDT-20 chassis.

NEWS!... More Quality Features

are Standard Equipment on MICHIGAN

½ yard models than on any comparable machine



The basic ½-yard turntable mechanism —maximum service accessibility.

Front-view of four of the MICHIGAN's six adjustable hook rollers.

In your point-for-point comparison (a smart buying tactic!) take special note of these great value features—"extras" on many other makes, standard on MICHIGAN ½ yard Truck Excavator-Cranes.

16-Ton Axles — tremendous strength! No wonder your MICHIGAN stands years of punishment.

404 Cubic-inch Truck Engine—huge power! Compare it to other ½-yard machines.

Cast Steel Turntable—machinery deck with boom hinge-pin bracket and hook roller brackets in a single rugged steel casting.

6 Hook Rollers—on most others you get only 3 or 4. MICHIGAN rollers are ball-bearing mounted for friction-free swings and tapered for easy adjustment.

Air Powered Clutches—famous for smooth, positive action; faster swing; minimum fatigue; and easy, quick service.

Ball Bearings—on all shafts and drums.

Power Up and Power Down — on the front drum for precision crane work.

Add these up and get this sure-thing, profitable answer: You Move More With A MICHIGAN. For more information, contact your local MICHIGAN distributor. Or send us the coupon.

MICHIGAN Tractor Shovels are available under the Clark Leasing Plan—we'll be glad to send you details.

CLARK EQUIPMENT

CLARK EQUIPMENT COMPANY 26
Construction Machinery Division
448 Second St., Benton Harbor, Michigan

☐ Please send MICHIGAN ½-yard Bulletin ☐ Send Lease Plan data sheet

Name _____ Title _____

Firm _____

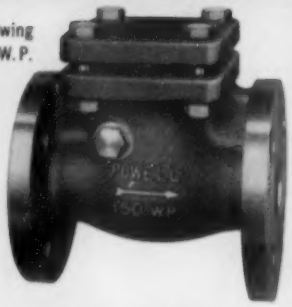
Address _____

City _____ County _____ State _____

POWELL VALVES . . . THE COMPLETE QUALITY LINE . . . POWELL VALVES

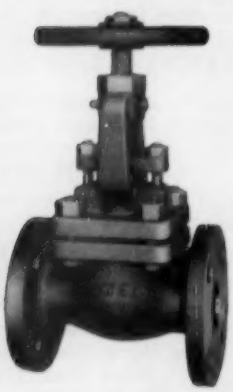
. . . THE COMPLETE QUALITY LINE . . . POWELL VALVES . . . THE COMPLETE QUALITY LINE . . .

FIG. 2342—Flanged End Bolted Cap Swing Check Valve for 150 Pounds W.P.



POWELL CORROSION RESISTANT VALVES

FIG. 2495—Double Disc Flanged End O.S.& Y. Gate Valve for 150 Pounds W.P.



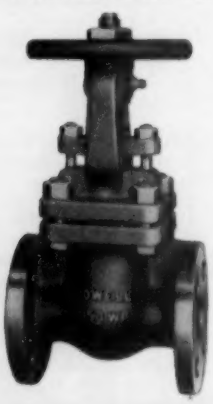


FIG. 2475—Stainless Steel O.S.& Y. Globe Valve for 150 Pounds W.P.

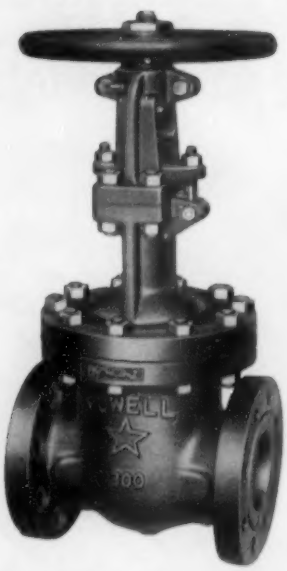


FIG. 3003SS—High Pressure Service Alloy Steel Gate Valve for 300 Pounds W.S.P.

POWELL VALVES . . . THE COMPLETE QUALITY LINE . . . POWELL VALVES

Powell can supply exactly the corrosion resistant valves you need . . . in a WIDE VARIETY of metal and alloys and all designs. You can be certain that every Powell Valve will give you dependable flow control.

Shown above are a few Powell Corrosion Resistant Valves. Investigate these . . . and the *complete* Powell line of quality valves that have a proven record of long, dependable service.

If no distributor is near you, we'll be pleased to tell you about our complete line, and help solve any flow control problem you may have. Write . . .

The Wm. Powell Company, Cincinnati 22, Ohio . . . . . 109th year

City County State

NEW EASTCO 2 CUTTER HOLE OPENER

The tool that's made explicitly for directional drilling work, and used to ream pilot holes to full gauge.

Just look at these outstanding advantages

- The entire body is a one piece steel casting, preventing "back-off" or "break-off" in the hole.
- Flat sides of pilot helps get into the rat hole.
- Ball end of pilot centers reamer in rat hole — reducing danger of sidetracking the hole to be reamed.
- Rugged roller bearing cutters that are easily and quickly changed. No welding necessary.
- Available in sizes ranging from 5⅝ inches to 14½ inches.

... another tool perfected from Eastman's years of field experience, engineering, research and design development work.

For further details call the Eastman office nearest you.

Eastman Oil Well Survey Company
LONG BEACH DENVER HOUSTON

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EASTMAN INTERNATIONAL COMPANY
P. O. Box 1500 Denver, Colorado

DIRECTIONAL DRILLING Eastman OIL WELL SURVEYS

Do you have this MARVEL Inverse Oiler on your { GASOLINE / BUTANE / or / DRY GAS } engine?

then you should use this MARVEL MYSTERY OIL in the Oiler!

Here's a carefully engineered pair to improve performance of any engine . . .

The *Marvel Inverse Oiler* is designed to feed *Marvel Mystery Oil* in exact proportion to engine speed and load. Prevents excess wear on valve stems and guides . . . keeps upper piston rings free to move in their grooves . . . retards ring flutter . . . and cushions ring pounding which can result in ring breakage. In addition, *Marvel Mystery Oil* reduces cylinder wall wear, and gives assurance against valves sticking. Remember, it is *the oil* which must do these things and only *Marvel Mystery Oil* is blended for this purpose and for this oiler. Over 30 years of exceptional performance.

This Chart shows the proper setting for constant load engines

BRAKE H. P. AT BELT	NAT. GAS CU. FT. PER HOUR	BUTANE GALLONS PER HOUR	GASOLINE GALLONS PER HOUR	M. M. OIL DROPS PER MIN.	M. M. OIL HOURS PER QUART
10	115.	1.07	1.12	4	228
15	172.5	1.60	1.68	6	152
20	230.	2.14	2.24	8	114
25	287.5	2.67	2.80	10	91
30	345.	3.21	3.36	12	76
35	402.5	3.74	3.92	14	65
40	460.	4.28	4.48	16	57
45	517.5	4.81	5.04	18	50
50	575.	5.35	5.60	20	45
60	690.	6.42	6.72	24	38
70	805.	7.49	7.84	28	33
80	920.	8.56	8.96	32	28
90	1035.	9.63	10.08	36	25
100	1150.	10.70	11.20	40	22
120	1380.	12.84	13.44	48	19
140	1610.	14.98	15.68	56	17
160	1840.	17.12	17.92	64	14
180	2070.	19.26	20.16	72	12
200	2300.	21.40	22.40	80	11
225	2587.5	24.00	25.20	90	10
250	2875.	26.75	28.00	100	9
275	3162.5	29.42	31.10	110	8
300	3450.	32.10	33.60	120	7

EXAMPLE:—If you use 805 cu. ft. of dry gas, 7.49 gallons of butane or 7.84 gallons of gasoline, your H.P. is about 70, so adjust oiler to feed 28 drops per minute. You will then receive about 32 hours per quart of MARVEL MYSTERY OIL.

If engine load increases after setting for normal load, oiler will automatically increase its feed, or decrease its feed when load is lessened.

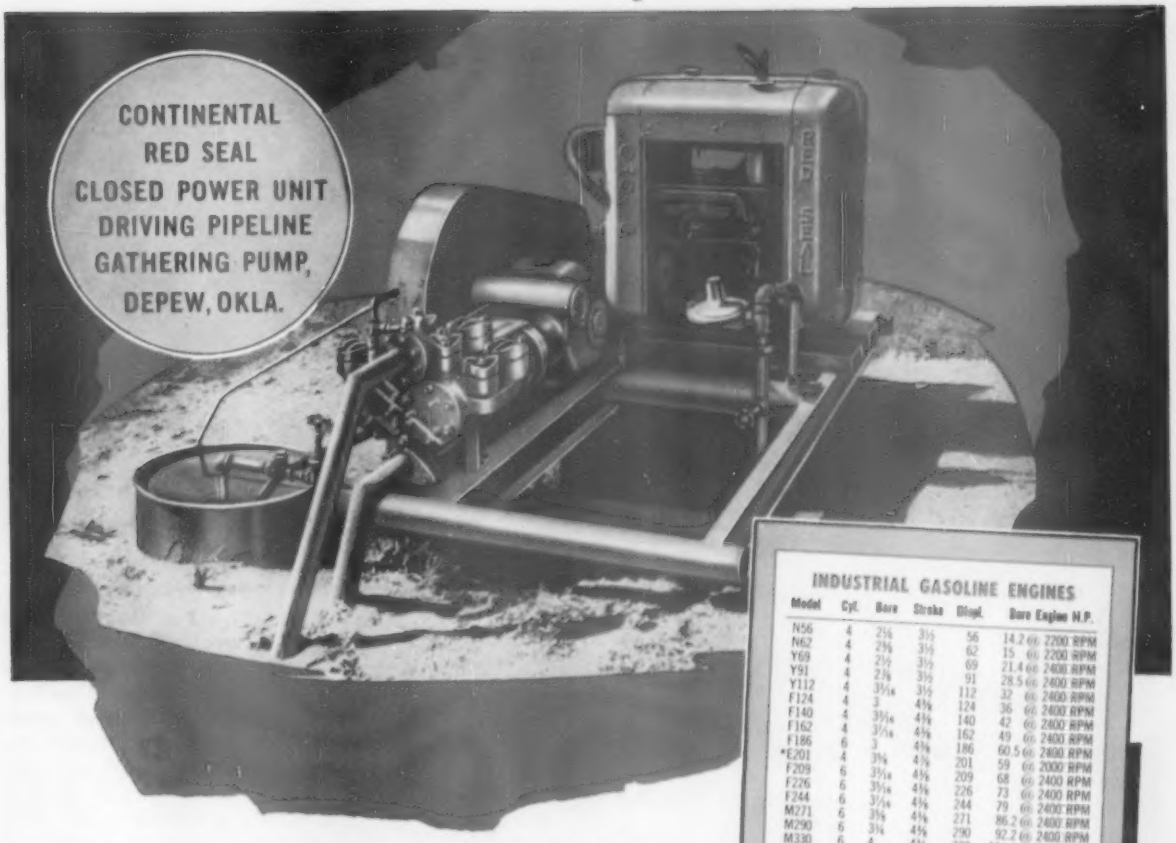
When more than one oiler is used

To determine drop count per oiler when more than one oiler is used on an engine—divide recommended drop count by number of oilers.

NOTE: Guarantee on oiler is void if any other oil than MARVEL MYSTERY OIL is used therein. Some *engines* also carry this guarantee policy.

See Your Local Jobber or Oil Well Supply House

EMEROL MFG. CO. Dept. 366, 242 West 69th Street, New York 23, N. Y.



CONTINENTAL RED SEALS
ARE ENGINEERED AND BUILT FOR LONGER LIFE...LOWER OVER-ALL COST

For more than 52 years, Continental has been engineering power plants to do more useful work per pound of engine weight, and building them to run longer with less time out for repairs. You do more work, at lower fuel and upkeep cost, with dependable Red Seal power. And the range of the Red Seal line—14 to 240 horsepower, gasoline and Diesel—assures a power plant engineered to the needs of every job, not only in the transportation, farm and industrial equipment fields, but in all phases of oil field operation. Equally important is the fact that Red Seals have the backing of genuine parts and factory-authorized service from coast to coast.

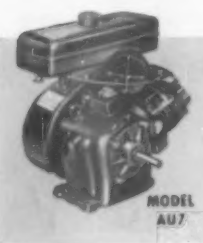
INDUSTRIAL GASOLINE ENGINES

Model	Cyl.	Bore	Stroke	Displ.	Bare Engine H.P.
N56	4	2⅛	3½	56	14.2 @ 2200 RPM
N62	4	2⅜	3½	62	15 @ 2200 RPM
Y69	4	2½	3½	69	21.4 @ 2400 RPM
Y91	4	2⅞	3½	91	28.5 @ 2400 RPM
Y112	4	3⅛	3½	112	32 @ 2400 RPM
F124	4	3	4½	124	36 @ 2400 RPM
F140	4	3⅛	4½	140	42 @ 2400 RPM
F162	4	3⅛	4½	162	49 @ 2400 RPM
F186	6	3	4½	186	60.5 @ 2400 RPM
*E201	4	3¾	4½	201	59 @ 2000 RPM
F209	6	3⅛	4½	209	68 @ 2400 RPM
F226	6	3⅛	4½	226	73 @ 2400 RPM
F244	6	3⅛	4½	244	79 @ 2400 RPM
M271	6	3⅜	4½	271	86.2 @ 2400 RPM
M290	6	3¼	4½	290	92.2 @ 2400 RPM
M330	6	4	4½	330	104.4 @ 2400 RPM
M363	6	4	4 15/16	363	109 @ 2000 RPM
B371	6	4⅛	4½	371	110 @ 2400 RPM
B427	6	4 1/16	4½	427	127 @ 2400 RPM
G134	4	3½	4½	134	32.2 @ 2000 RPM
G157	4	3½	4½	157	37.7 @ 2000 RPM
H227	4	3⅝	5½	227	52 @ 1800 RPM
H243	4	3¾	5½	243	56 @ 1800 RPM
*H260	4	3⅞	5½	260	60 @ 1800 RPM
T371	6	4⅛	4½	371	119 @ 2400 RPM
*J382	4	4½	6	382	74.2 @ 1400 RPM
T427	6	4 1/16	4⅞	427	140 @ 2400 RPM
U501	6	4½	5¼	501	160 @ 2400 RPM
R513	6	4½	5⅛	513	164.3 @ 2400 RPM
R572	6	4¾	5⅛	572	182.4 @ 2400 RPM
R602	6	4⅞	5⅛	602	191.7 @ 2400 RPM
V603	8	4¼	4¼	603	240 @ 3200 RPM
S749	6	5⅛	5½	749	217 @ 2200 RPM
S820	6	5⅝	5½	809	237 @ 2200 RPM

INDUSTRIAL DIESEL ENGINES

Model	Cyl.	Bore	Stroke	Displ.	Bare Engine H.P.
GD157	4	3½	4½	157	39 @ 2000 RPM
*ED201	4	3¾	4½	201	45.8 @ 2000 RPM
HD243	4	3¾	5½	243	54.7 @ 2000 RPM
*HD260	4	3⅞	5½	260	59.3 @ 2000 RPM
*JD382	4	4½	6	382	72.5 @ 1600 RPM
TD427	6	4 1/16	4⅞	427	106.5 @ 2000 RPM
RD572	6	4¾	5⅛	572	142.5 @ 2000 RPM
VD603	8	4¼	4¼	603	182 @ 2800 RPM
SD802	6	5 5/16	5½	802	202 @ 1800 RPM

*Available for industrial applications only.



MODEL AU7

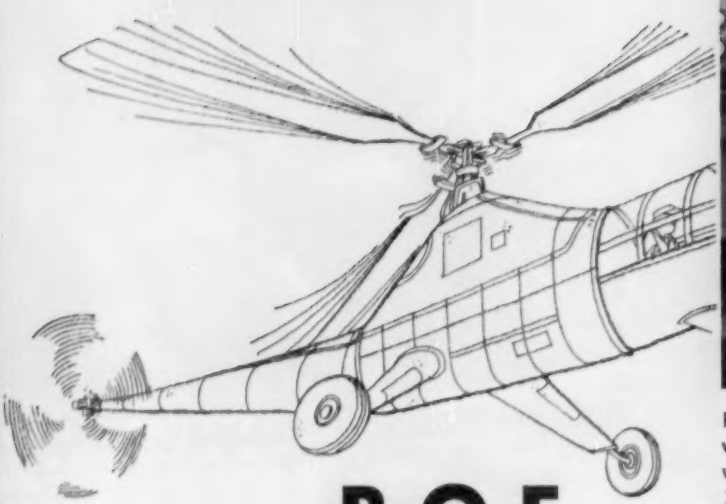
A COMPLETE LINE OF 4-CYCLE AIR-COOLED ENGINES—Continental also builds air-cooled models, from 2 to 3 h.p., for heavy-duty applications, both conventional and vertical shaft. They offer the exclusive Contex® external ignition system, greatest air-cooled engine advance in recent years. For information, address Air-Cooled Industrial Engine Division, 12800 Kercheval Avenue, Detroit 15, Michigan.

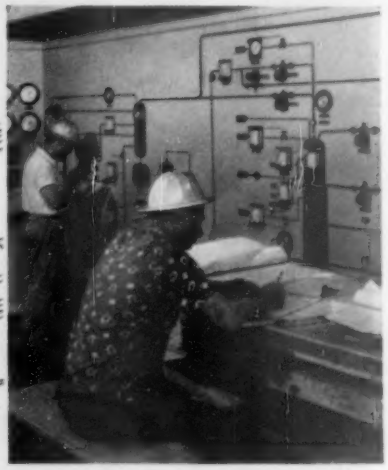
CONTINENTAL MOTORS · Powerful as the Nation · AMERICA'S STANDARD ®

Continental Motors Corporation
MUSKEGON, MICHIGAN

6 EAST 45TH STREET, NEW YORK 17, NEW YORK • 6218 CEDAR SPRINGS ROAD, DALLAS 9, TEXAS • 3817 SOUTH SANTA FE AVENUE, LOS ANGELES 58, CALIFORNIA • 910 SOUTH BOSTON STREET, ROOM 1008, TULSA, OKLAHOMA • 1252 OAKLEIGH DRIVE, EAST POINT (ATLANTA) GEORGIA

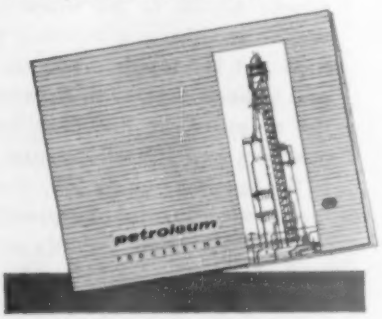
Capsule Case History:





Process Stability with Operating Flexibility was provided when an additional 18,000 BPD cat-cracker was added to a Southwest refinery recently by Kaiser Engineers. The use of the KE-designed panel put the entire operation under the centralized supervision of three men. This example of automation in action is typical of the flexibility which is available to your firm through the services of Kaiser Engineers. An early call to the KE team of petroleum specialists is the first step in providing the best in low cost design and construction of your next petroleum or petrochemical project.

Write for the new KE petroleum processing brochure No. 103.



B.O.F.

***B**uilt-in **O**perational **F**lexibility (outstanding characteristic of the helicopter) is an "extra" found in every plant designed and built by Kaiser Engineers. Not hidebound by tradition, the fresh approach of the KE team of specialists assures you that your next plant will feature efficient and flexible operation at low cost.*

kaiser | engineers ...for low operating costs

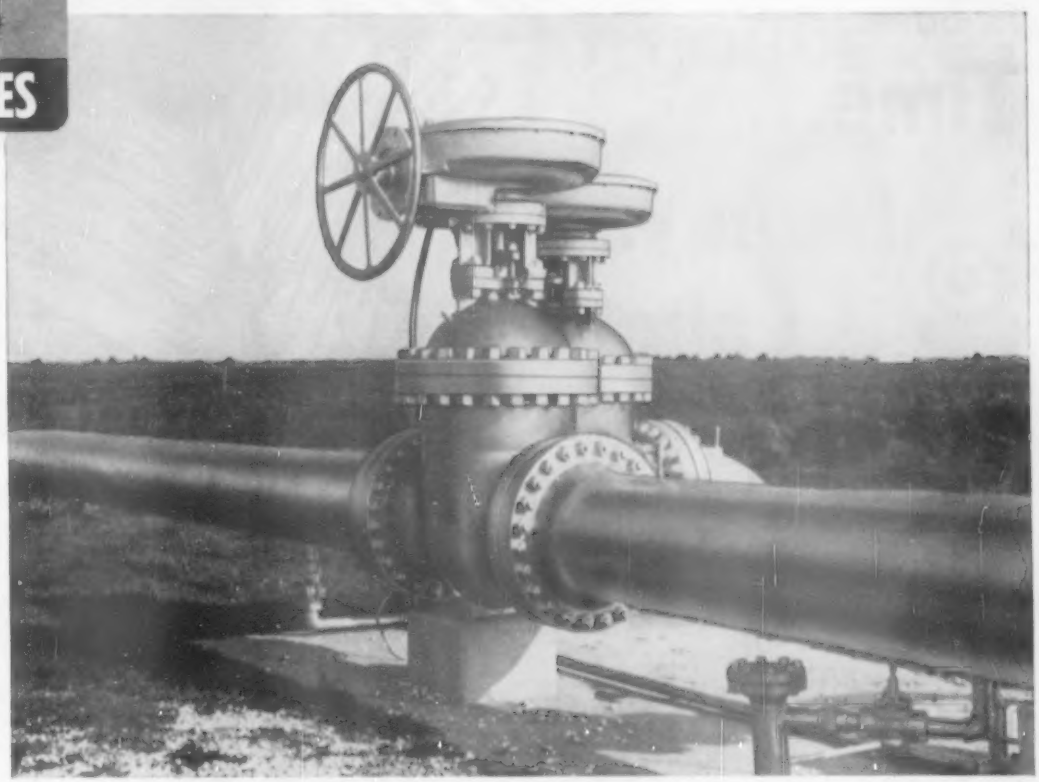
DIVISION OF | HENRY J. KAISER COMPANY

ENGINEERS K CONTRACTORS

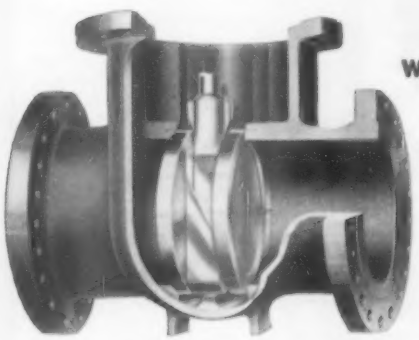
• HOME OFFICE: KAISER BUILDING, OAKLAND 12, CALIFORNIA (CABLE: KAISENGS) NEW YORK, PITTSBURGH, LOS ANGELES, WASHINGTON, D. C.
• HENRY J. KAISER CONSTRUCTION CO. • HENRY J. KAISER COMPANY (Canada) LTD., MONTREAL

DARLING VALVES

FOR PLUS VALUES, JOB-PROVED AGAIN AND AGAIN



Above: A pair of Darling 20" cast steel gate valves, equipped with bevel gear and gear case, installed on a major oil line. Because of tight closure and trouble-free performance in general, Darling fully revolving double disc parallel seat valves win favor on line after line.



Cutaway view showing complete simplicity of the Darling fully revolving double disc, parallel seat cast steel gate valve. Just four simple working parts . . . two interchangeable, no-pocket discs and two husky wedges. Maintenance is easy, assembly foolproof. Full seat opening allows free passage of line scrapers.

with Darling revolving double disc parallel seat gate valves

You can count on tight closing!

YOU can't entirely avoid valve body distortion in pipe line service. No matter! Darling's compensating wedge principle *automatically* adjusts for seat misalignment! Moreover, the gate discs, independently hung and free to revolve fully, change their seating position at each closing. This means *uniform* wear distribution. The valves work better and last longer, require less attention, less maintenance! And *you* avoid headaches.

SEND FOR DATA

Darling fully revolving double disc gate valves come in a wide range of types and sizes for main line, gathering, manifold, tank farm and all other gas and oil line services. Outline your particular service needs or ask for complete descriptive bulletin.

DARLING VALVE & MANUFACTURING CO.

Williamsport 1, Pa.

Manufactured in Canada by Sandilands Valve Manufacturing Co., Ltd., Galt 19, Ontario

Saves

Time... Money... Labor

"K" Monel Collar Enables Accurate Control of Straight Hole or Directional Drilling

When you reach your target without deviation, you save substantially in rig time, labor and other expenses, which may only show up later.

You can make a *constant check* on deviation when you drill using a "K" Monel drill collar. For non-magnetic "K" Monel drill collars render it possible to make straight-hole tests *and* directional surveys at the same time . . . as often as you want. And without round-tripping pipe. That way you not only know whether you're keeping within property lines, but also, the exact direction of the well at every point. You have a complete record that you can refer to any time during the life of the well.

And, of course, for controlled directional drilling, a "K" Monel collar is practically essential.

When positioned in a "K" Monel collar, the survey instruments are not only free of magnetic effects from the drill string, but are also properly centered and aligned. And there are none of the hazards inherent in running instruments in open hole.

At all well temperatures, and regardless of cold-working, "K" Monel remains non-magnetic. Drilling contractors can lease "K" Monel collars from the Sperry-Sun Well Surveying Company at 3118 Blodgett Avenue, Houston 4, Texas.

Whatever your job, when you face an oil field metal problem, let Inco engineers help find the solution. From among the many Inco Nickel Alloys available, there is probably one that meets your needs, exactly. If not, they'll work with you to find the right answer.

THE INTERNATIONAL NICKEL COMPANY, INC.
67 Wall Street New York 5, N. Y.

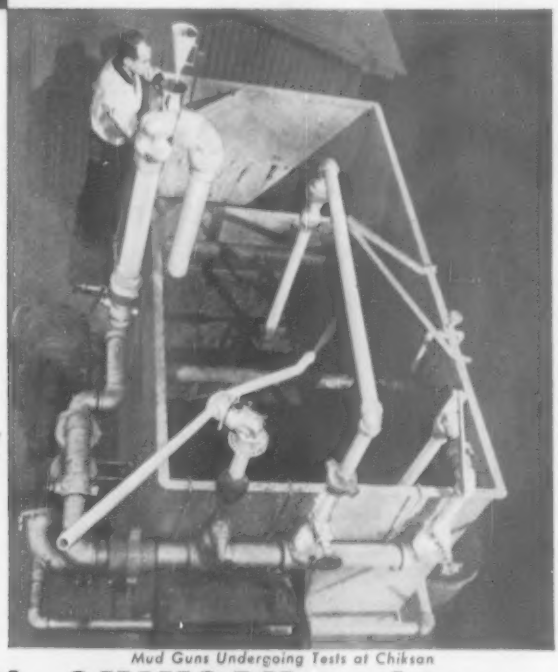
Accurate Drilling is assured in both vertical and directional work without pulling the string, when survey instruments are lowered into a non-magnetic "K" Monel drill collar. By insisting on this method, you can avoid excessive equipment wear and other operational difficulties caused by crooked holes.
(Picture courtesy of Sperry-Sun Well Surveying Company, Houston, Texas.)

Inco Nickel Alloys

Monel® • "R"® Monel • "K"® Monel • "KR"® Monel
"S"® Monel • Inconel® • Inconel "X"®
Inconel "W"® • Incoloy® • Nimonic® Alloys
Nickel • Low Carbon Nickel • Duranickel®

INCO

here's to no "mud in your eye"



Mud Guns Undergoing Tests at Chiksan

with *CHIKSAN* mud guns...

Chiksan Mud Guns provide complete safety, flexibility and economy in the drilling operation of the oil industry.

The heart of the guns is the Chiksan Ball-Bearing Swivel Joint, made of tough, hardened steel for long life and trouble-free maintenance.

These Chiksan Mud Guns come in three distinct types illustrated in the left hand panel. They are the standard of the drilling industry, proved by years of economical operation.

WRITE FOR CHIKSAN CATALOG, DEPT. OGJ-2

a:
NON-SPIN MUD MIXING GUN
The Chiksan Non-Spin Mud Gun illustrated above can't spin because centrifugal force is neutralized by the offset in the barrel of the gun. Perforated flanges and locking pins permit locking the gun in any desired position.

b:
BOTTOM TYPE MUD MIXING GUN
The Chiksan Bottom Type Mud Gun is designed for use where large size metal tanks are employed as mud pits. It is simple in construction; easy to install, and easy to operate.

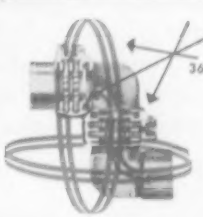
c:
SPINNER TYPE MUD MIXING GUN
The Chiksan Spinner Type Mud Gun is designed for use in tanks where the utmost in constant agitation is desired. The nozzles are set at an angle and the pressure in the line imparts a spinning motion which is accommodated by a style No. 20 Chiksan High Pressure Swivel Joint. Furnished in any desired length as specified on order.

The Flow of Enterprise Relies on

CHIKSAN

Ball-Bearing Swivel Joints

THE NEW TOOL OF MODERN INDUSTRY



CHIKSAN Ball Bearing Swivel Joints are THE NEW TOOL of Modern Industry with full 360° rotation in 1, 2, and 3 planes. Over 1,000 different types, styles, and sizes have been developed for pressures and services from 28" vacuum to 15,000 psi and for temperature ranges from minus 70° to a plus 500° F. with packing materials for each specific service.

CHIKSAN COMPANY • BREA, CALIFORNIA • Chicago 3, Illinois • Newark 2, New Jersey

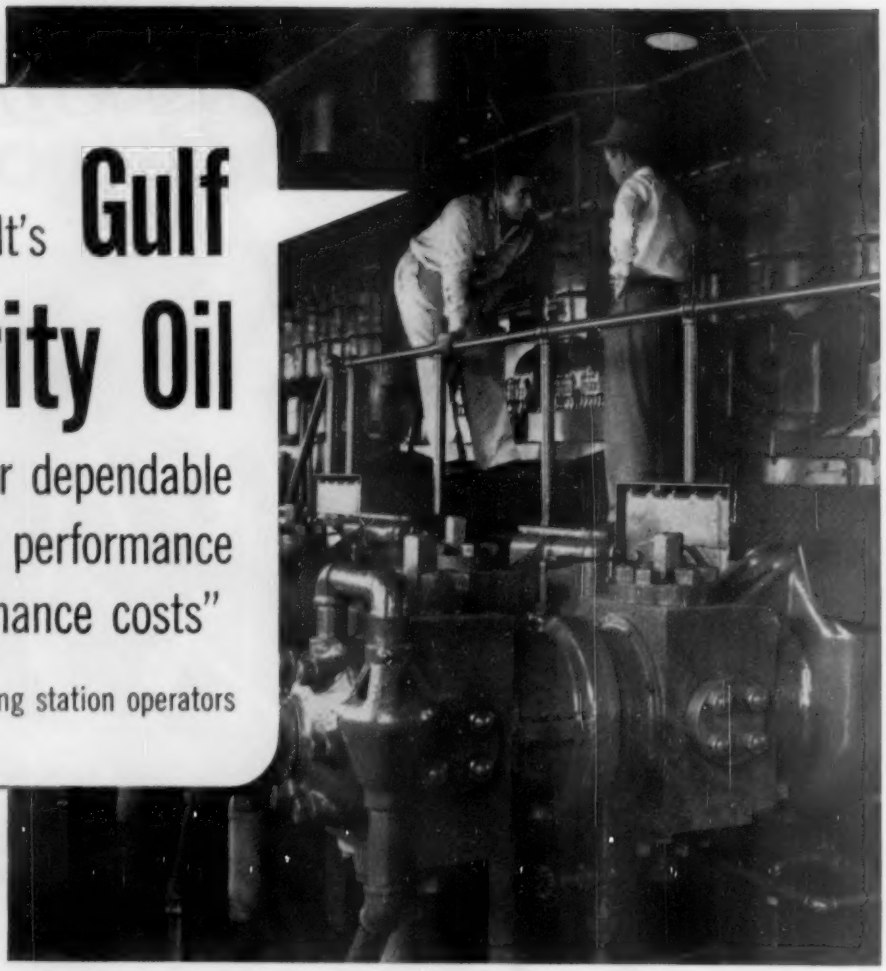
Well Equipment Mfg. Corp. (Division), Houston 1, Texas • Subsidiaries: Chiksan Export Co., Brea, Calif., Newark 2, N.J. • Chiksan of Canada Ltd., Edmonton, Alta.

"It's **Gulf**

Security Oil

for dependable
gas compressor performance
and low maintenance costs"

say pumping station operators



Smooth, continuous operation is a must for these units in service at a South Texas gas compressor plant. They are responsible for the steady flow of essential natural gas through pipe lines to homes and industries as far north as Detroit and New York. Gulf Security Oil provides the sure, effective protection needed for cylinders and bearings in both engines and compressors.

You can depend on Gulf Security Oil to provide the proper lubrication that is so important to vital compressor units if operating troubles are to be prevented and maintenance costs kept low.

Gulf Security Oil has a record of outstanding performance in scores of gas transmission plants. After years of operation with this quality oil, the cylinders and piston rings of both the compressors and power assemblies show negligible wear. And few carbon deposits have formed on power cylinder ports and pistons.

If you are installing new compressor units, or feel that you're not getting the most effective lubrication possible for your present units, it will certainly pay you to try Gulf Security Oil. Contact your nearest Gulf Office and have a Gulf Sales Engineer call.

Gulf Oil Corporation • Gulf Refining Company
1822 GULF BUILDING, PITTSBURGH 30, PENNSYLVANIA

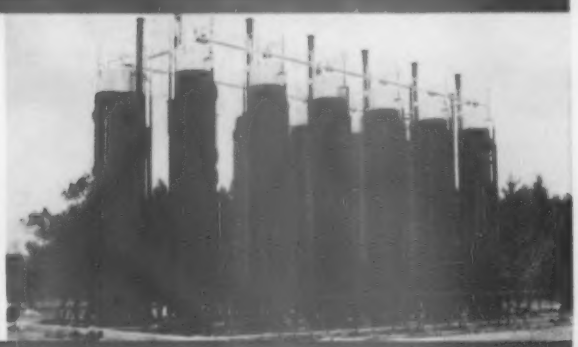
GULF

The finest petroleum products for your every need

For high pressure surface lines

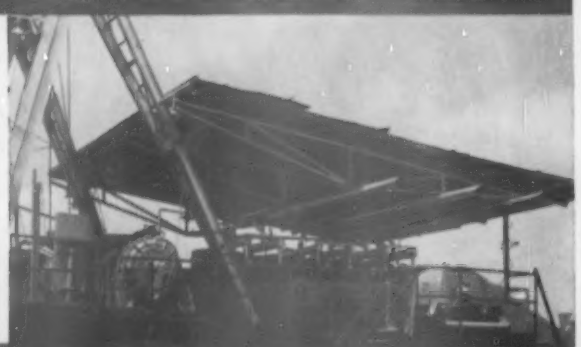
. . . for low pressure tank battery lines

. . . for water flooding lines



. . . for treater installation lines

. . . for field service lines



. . . for exhaust pipes and structural uses

. . . it's top-quality SPANG® CW steel pipe

In these, and dozens of other applications, SPANG CW Steel Pipe has proved itself time after time to be a *top-quality* pipe for general service work in the oil fields.

That's because SPANG CW is made from *top-quality* steel, is formed and welded under close *quality-control* conditions, and is thoroughly tested and inspected before shipping. This care in manufacturing makes SPANG CW easy to work with and install; it means SPANG CW is a *top-quality*, dependable product with years of built-in service life.

Try SPANG CW Steel Pipe on your next job. It's available at all National Supply Stores.

THE NATIONAL SUPPLY COMPANY

First in quality . . . First in supply service in oil country everywhere

SPANG-CHALFANT DIVISION

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NATIONAL BLUE OIL FIELD MACHINERY AND EQUIPMENT
SPANG STEEL PIPE • SUPERIOR AND ATLAS ENGINES

Rockwell-Built

MUDWONDER

Cuts High Maintenance Costs to Zero IN JET SERVICE ON DELTA GULF RIG No. 5

"We have drilled 45,000 ft. of hole since equipping our jet guns with 2 in. MUDWONDER mud valves," says Toolpusher W. M. (Mack) Ault. "These valves have been in constant service, operated under extreme pressures on fluids containing as much as eight per cent sand and at times as much as 12 lb. per barrel lost circulation material. They have required no maintenance and have operated with ease at all pressures."

The cost of maintaining mud valves, especially the jet or mud gun valves, had reached an alarming figure on the Delta Gulf Drilling Company Rig No. 5 working in the Lake Charles, Louisiana, area. According to Mack, MUDWONDER valves are just what has been needed for a long time in the oil field to help reduce operating costs.

Is it any wonder Mack's crew feels MUDWONDER valves can cure any mud valve problem? MUDWONDER has licked their worst.

On standpipes, jet guns, pump discharges, whatever your troublesome service is, you will cut costly down-time and part replacement with competitively-priced MUDWONDER mudline valves. Ask your favorite supplier or use the coupon below for complete details, today.

Edward Valves, Inc.
Subsidiary of
ROCKWELL MANUFACTURING COMPANY
1212 West 145th Street
EAST CHICAGO, INDIANA

Send me your latest MUDWONDER catalog and price list for 3000 psi WP (6000 psi test) and 2000 psi WP (4000 psi test) mudline valves.

Name_____

Company_____ Title_____

Address_____

City_____ Zone_____ State_____

Six New Booster Stations
DOUBLE PLATTE PIPE LINE CAPACITY

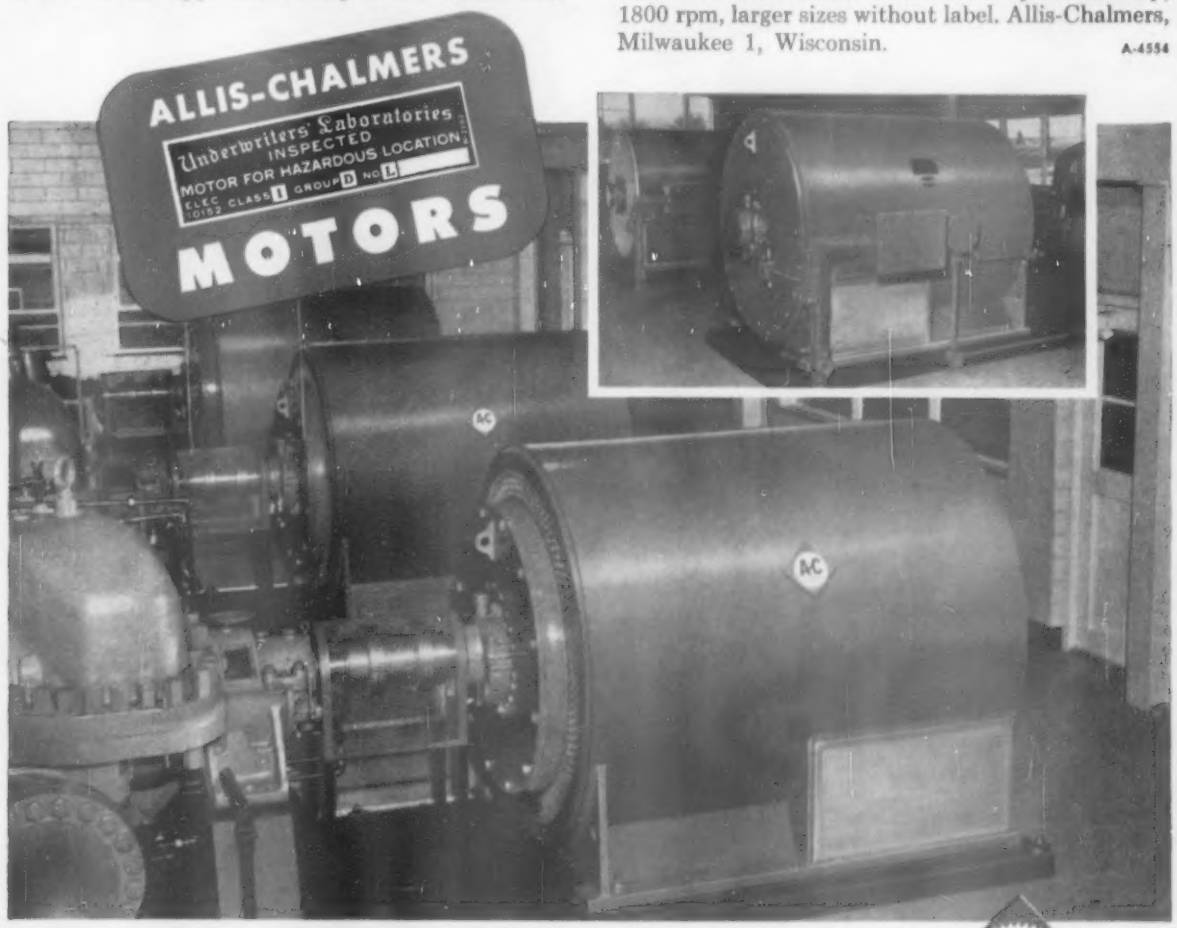
New stations use 1250-hp Allis-Chalmers Underwriters' approved motors. Similar design motors used in initial stations.

EIGHTEEN OF THESE 1250-HP MOTORS plus seven 900-hp and three 450-hp motors of similar design drive pumps in Platte Pipe Line Company's six new and three expanded stations on their line stretching from Wyoming to Wood River, Illinois. The original stations on this line were equipped with Underwriters' approved 800-hp A-C motors. This expansion program more than doubles line capacity without additional pipe. With motors, pumps, valves and other equipment controlled from Kansas City by microwave relay, only one attendant is required at each station.

Allis-Chalmers tube-type explosion-proof motors have proved their economy and dependability for both indoor and outdoor operation. Easy to clean tube-type air-to-air heat exchangers keep maintenance low. Heavy-duty construction takes round-the-clock pipe-line operation in stride.

Get complete information from your Allis-Chalmers District Office or write for Bulletins 05B7150 and 05R8189. Available with label up to 1250 hp, 1800 rpm, larger sizes without label. Allis-Chalmers, Milwaukee 1, Wisconsin.

A-4554



Photos show station at Gower, Missouri. Five other stations have similar equipment. All are controlled by microwave relay from central dispatch office in Kansas City.

A-C ALLIS-CHALMERS

ALLIS-CHALMERS

CARBIDE

the NAME to keep in mind

...for MONOETHANOLAMINE
DIETHANOLAMINE
DIETHYLENE GLYCOL
TRIETHYLENE GLYCOL

You get *more* than gas-treating chemicals when you specify CARBIDE . . .

You get these extra benefits...

- the results of CARBIDE's 20 years' experience in the manufacture of amines and glycols.
- the service of CARBIDE's field representatives.
- the assistance of CARBIDE's laboratories where specialists devote a great amount of time to work on customer service problems.
- the benefit of CARBIDE's knowledge about the handling, properties, and use of these chemicals.
- the assurance of availability and fast service through CARBIDE's national distribution network of 50 warehouses. (In Canada: Harrisons & Crosfield's.) Shipments are made in tank cars, tank wagons, and drums in carload or truckload lots.

Remember

You get *more* than chemicals when you specify CARBIDE.

CARBIDE
AND CARBON
CHEMICALS

Carbide and Carbon Chemicals Company
A Division of
Union Carbide and Carbon Corporation
30 East 42nd Street UCC New York 17, N. Y.

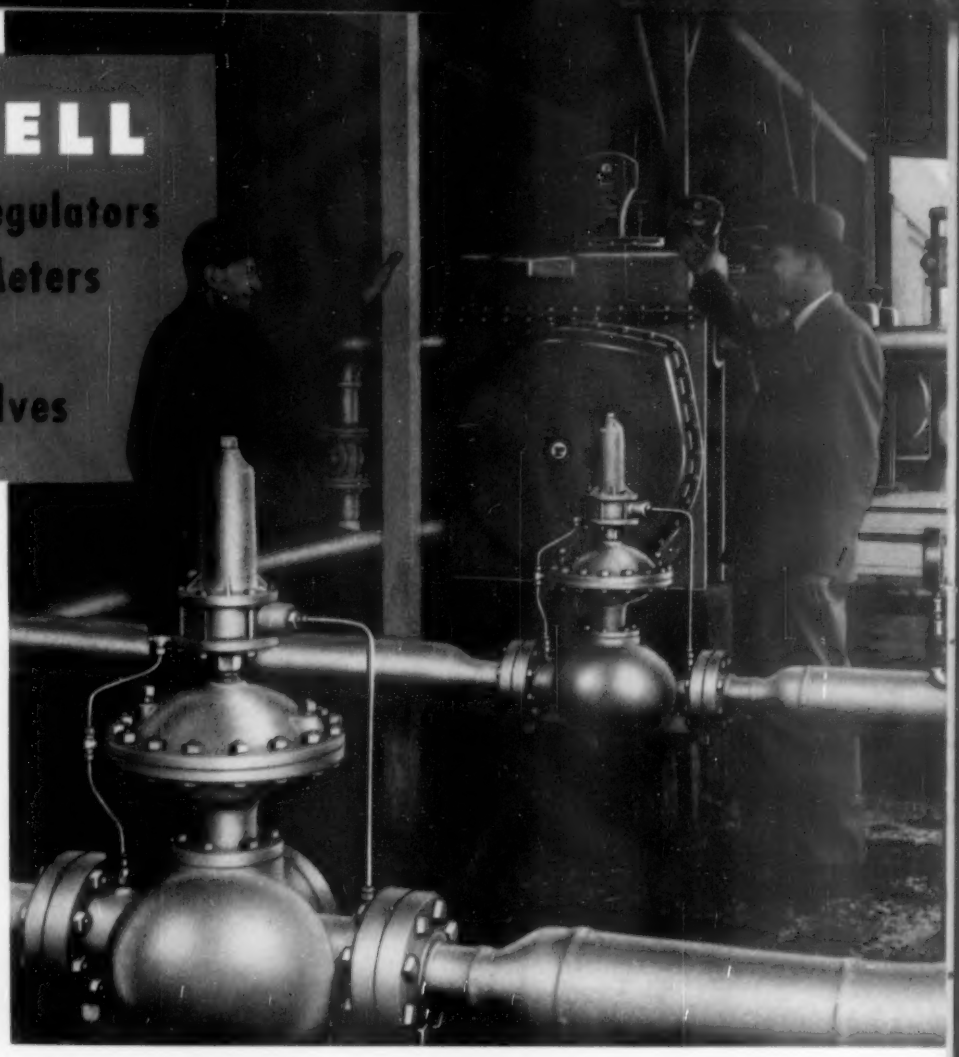
IT FIGURES BEST!

This No. 4 Rockwell meter has a mechanical brain. It's fitted with a Rockwell Emcorector gauge. The Emcorector accurately converts the volume of gas measured at high, variable pressures to a corrected constant base pressure volume for billing purposes. The total appears directly on a straight reading counter. No calculations are required. Here's another way Rockwell metering earns money, saves time and effort for gas utilities.

Rockwell Large Capacity Meter with Emcorector

ROCKWELL

"015" Pressure Regulators
Pressed Steel Meters
Nordstrom
Lubricated Valves



MAKE BIG B.T.U. BINS BEHAVE!

Getting the maximum in revenue at lowest cost per cubic foot measured is yours when you entrust your big jobs to Rockwell meters, regulators and Rockwell-Nordstrom valves. For many years these better-built products have enjoyed an ever increasing measure of gas industry acceptance. Their accuracy and dependability have been proved by time, their low servicing costs are a matter of record. Next time why don't you go Rockwell all the way? Learn the economies of dealing with one reliable source and having but one responsibility for your complete satisfaction.

ROCKWELL MANUFACTURING COMPANY

PITTSBURGH 8, PA. Atlanta Boston Chicago Dallas Houston Kansas City, Mo. Los Angeles New York Philadelphia Pittsburgh San Francisco Seattle Tulsa

In Canada: Peacock Brothers Limited

SQUEEZED FOR SPACE?

If limited floor space poses an installation problem consider these advantages. Both Rockwell Pressed Steel meters and "015" Pilot Loaded regulators go up in the air. They frequently save valuable ground space. You can manifold them in less area than other designs. Too, Rockwell-Nordstrom valves are most compactly designed—instantly respond to quick, quarter turn operation.

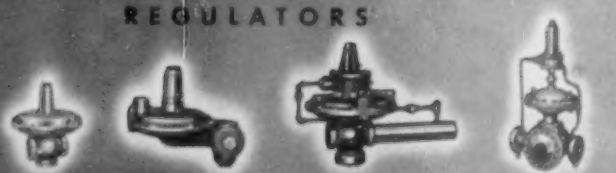
YOU CAN RELY ON ROCKWELL

There's a ROCKWELL METER and REGULATOR for every use

METERS

ALUMINUM CAST IRON PRESSED STEEL

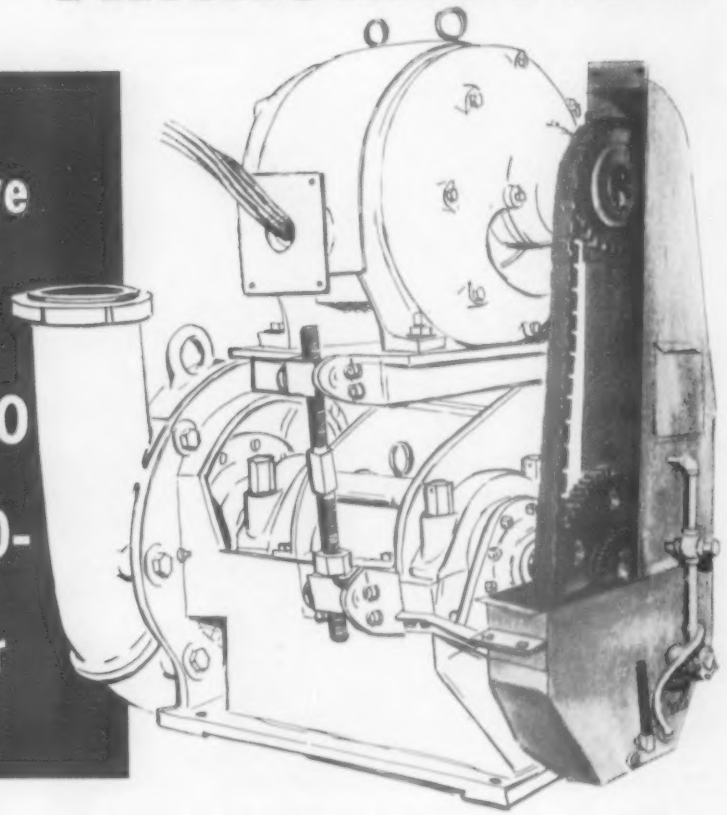
REGULATORS



INDUSTRIAL SERVICE "1001" BALANCED VALVE

HY-VO facts for a new age in POWER TRANSMISSION

How you can save up to $1,407.00 with MORSE HY-VO on a 350-hp., 1800-rpm electric motor



Now, with Morse Hy-Vo Drives, you can gain new advantages from buying smaller, higher speed, more efficient electric motors.

You save weight, space, and electric power. And in most cases, the difference in cost between a low-rpm motor and a high-rpm motor of the needed horsepower, will more than pay for the Hy-Vo Drive. Let's look at an example:

Generally, the commonly used methods of power transmission, due to inherent restrictions on rotative speed and velocity, limit the speed of 200-hp. or larger motors to 1200 rpm. Hy-Vo's upper limits are far greater, ranging up to 3600 rpm for ¾" pitch.

Suppose you needed a 350-hp. motor. According to the catalog base price of one prominent motor manufacturer, a 1200-rpm, 350-hp. motor costs $13,709. But an 1800-rpm, 350-hp. motor costs only $12,302. You save up to $1,407. Also, your higher rpm motor would weigh 200 pounds less.

And with a narrow Hy-Vo, it's very likely you'd do away with the cost of outboard bearings and mountings. Bonus savings!

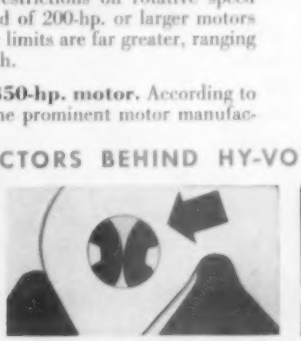
Write us for detailed information on the savings Hy-Vo will bring in your electric-motor applications, or of the comparable savings Hy-Vo can make, because of its high rotative and velocity limits, on your internal combustion engine applications.

MORSE CHAIN COMPANY

7601 Central Avenue • Detroit 10, Michigan

SOME DESIGN FACTORS BEHIND HY-VO'S SUCCESS...

Hy-Vo's many design and manufacturing refinements result in a drive with unusual power-transmitting capacity. Note involute tooth design of Hy-Vo Sprockets . . .



. . . and the new, Hy-Vo Compensating Rolling Joint, which always shifts the pitch line automatically as the Hy-Vo Chain engages the involute teeth of the sprocket.

Chain follows a path truly tangent to sprocket pitch circle, thus almost eliminating chordal action. A new, balanced link design greatly improves stress distribution.

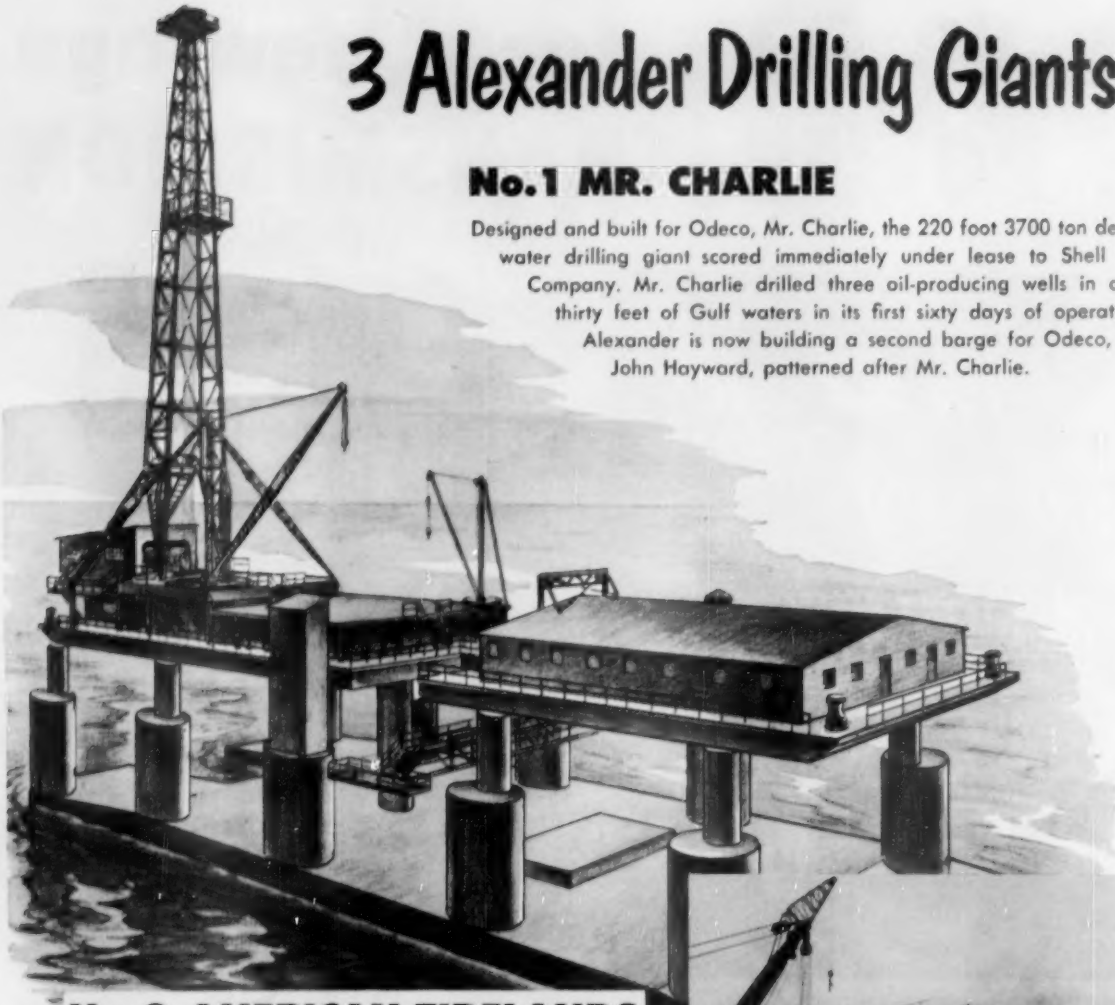
MORSE

MECHANICAL POWER TRANSMISSION PRODUCTS

3 Alexander Drilling Giants!

No. 1 MR. CHARLIE

Designed and built for Odeco, Mr. Charlie, the 220 foot 3700 ton deep-water drilling giant scored immediately under lease to Shell Oil Company. Mr. Charlie drilled three oil-producing wells in over thirty feet of Gulf waters in its first sixty days of operation! Alexander is now building a second barge for Odeco, the John Hayward, patterned after Mr. Charlie.



No. 2 AMERICAN TIDELANDS

The 380 ton lift (right) is the drilling end of Alexander's second current deep-water barge and is being built for American Tidelands, Inc. The barge is 200′ x 74′ x 92′ (from hull bottom to helicopter deck), drills in 45 feet of water and accommodates 40 men.

No. 3 JOHN HAYWARD

Alexander's second deep-water barge for Ocean Drilling and Exploration Company is the John Hayward, sister ship to Mr. Charlie. The John Hayward is 180′ x 120′ x 70′ (from hull bottom to helicopter deck.) It was launched in October, fifty days ahead of schedule and is slated for delivery early in '55.

ALEXANDER Shipyard INC.

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You've probably met one or more of these men in your contacts in the refinery industry. They've done just about every job in refineries prior to their engineering-construction careers.

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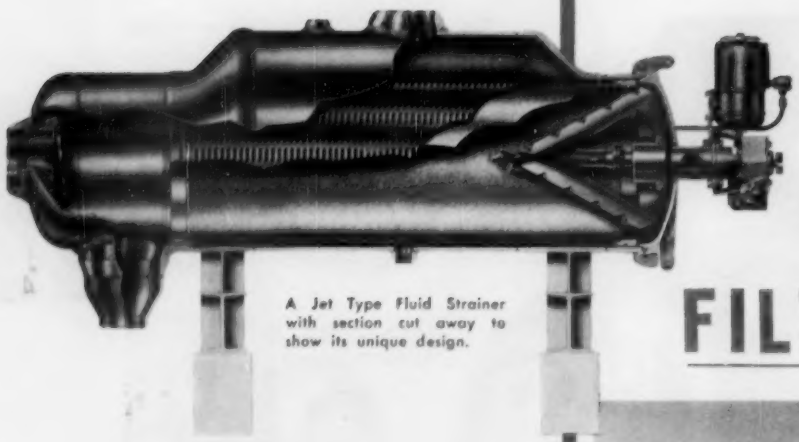
TULSA **TORONTO**



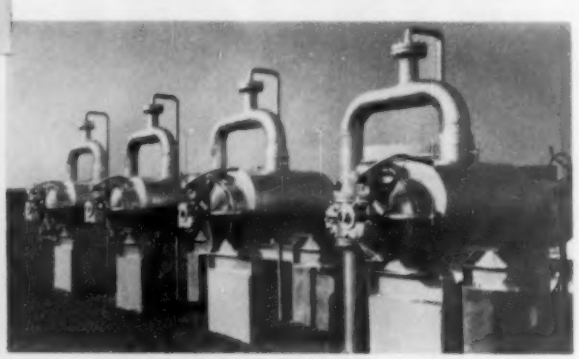
A Jet Type Fluid Strainer with section cut away to show its unique design.

WHAT PRICE FILTRATION?

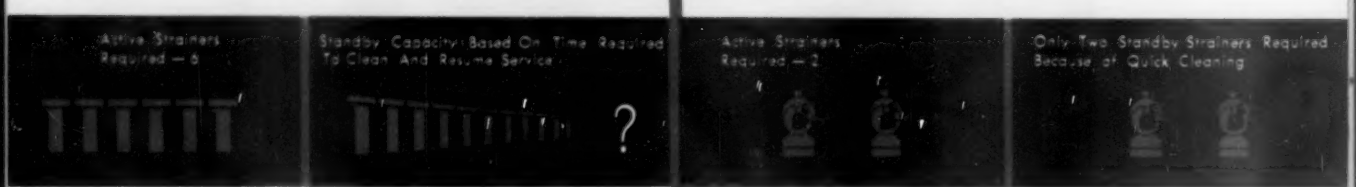
Let's examine two installations required to handle 60,000 bpd: One with conventional vertical sock type strainers of approximately 10 square feet of filter area each; the other with Jet Type Horizontal Strainers of approximately 30 square feet of filter area each.

Required: One square foot of filter area per 1,000 bbls. per day or a total of 60 square feet of filter area with **adequate** standby capacity to assure no by-passing, at any time, of dirty strainers, or pipeline shutdown time for cleaning strainers.

OBJECTIVE: **To filter all the product, all the time.***



An installation of four, 30,000 bpd capacity Jet Type Strainers on a new products pipeline.


Active Strainers Required — 6
Standby Capacity Based On Time Required To Clean And Resume Service
?
Active Strainers Required — 2
Only Two Standby Strainers Required Because of Quick Cleaning

INSTALLATION REQUIREMENTS

1. Valves — 3 Per Strainer
2. Extensive Manifolding
3. Installation Labor — Maximum
4. Overhead Crane for Lifting Closure and Basket
5. Sump
6. No Recording Instruments

STRAINER MAINTENANCE

1. Cleaning — Remove Closure and Replace Felt Manually. (Two Men 30 Minutes, 1 Man-Hour)
2. New or Reconditioned Felt Required for Each Cleaning
3. Replacement of Collapsed Strainer Elements Due to Excessive Pressure
4. No Automatic Operation Possible

*The expense of complete filtration is more than justified by the prevention of damage to closely fitted mechanical devices necessary to the operation of a pipeline.

INSTALLATION REQUIREMENTS

1. Valves — 3 Per Strainer
2. Less Manifolding
3. Less Installation Labor
4. No Overhead Crane
5. Sump
6. Pressure Differential Recording Gauge to Assure Daily Record of Pipeline Operation.

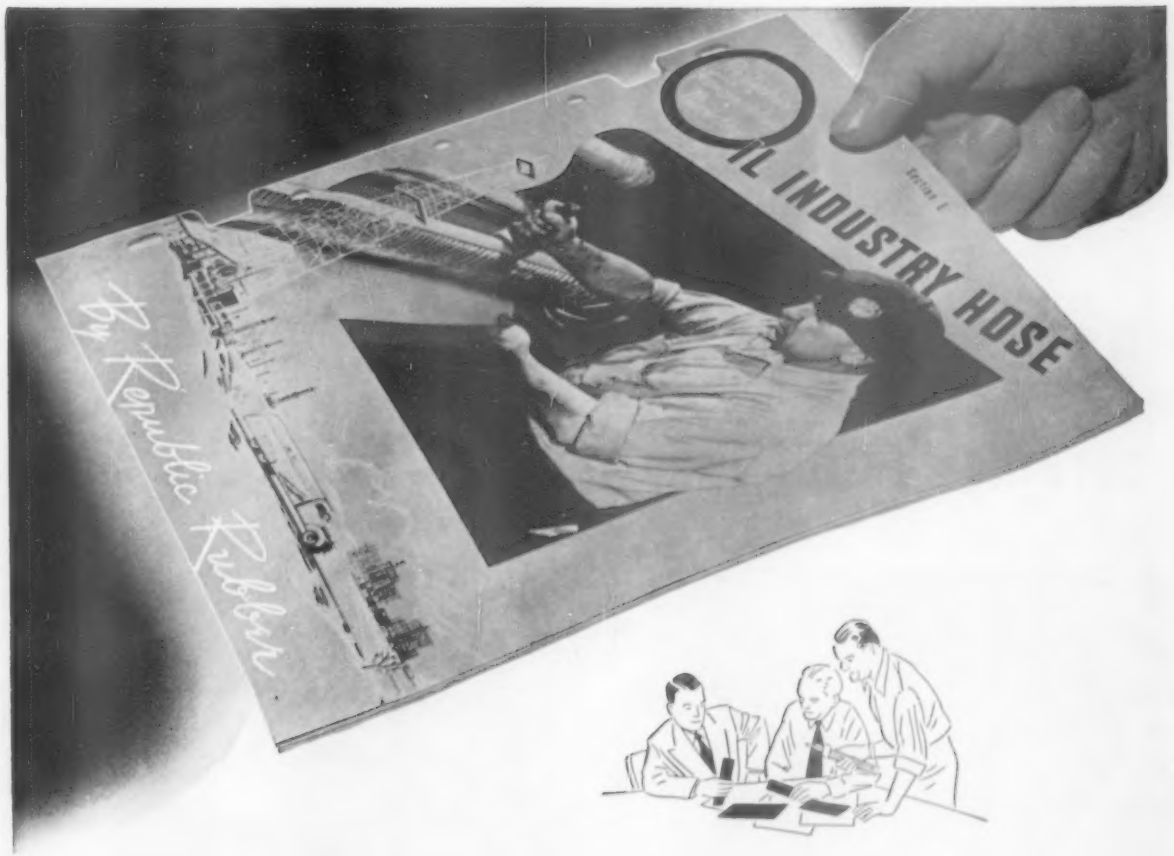
STRAINER MAINTENANCE

1. Cleaning Accomplished By One Man in **Less Than 5 Minutes** Without Opening Strainer
2. Stainless Mesh Screen Lasts Indefinitely
3. Alarm System Prevents Damage to Strainer Element Due to Excessive Pressures
4. Can Be Made Fully Automatic

ADDITIONAL OPERATING ADVANTAGES OF JET STRAINERS

1. Stream can be cleaned to any desired degree — 100, 200, 325, or 400 mesh screens optional.
2. Can be made fully automatic for operation at remote station.
3. Greater Safety — Strainer is cleaned without opening, consequently workmen are not subjected to danger of fumes and fire.

THORNHILL CRAVER CO.
P. O. BOX 1184 HOUSTON, TEXAS



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Like an Expert

First, there's the matter of availability You need the hose in a hurry, so you want **prompt delivery**—not a promise of prompt shipment

Your local distributor has a fresh stock of Republic Oil Industry Hose ready for **prompt delivery.**

Second, you want to select the **right** hose for your particular application.

Republic makes this selection easy for you in the Oil Industry Hose Catalog pictured here.

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Stocked in the Mid-Continent Area by JONES & LAUGHLIN STEEL CORPORATION, Supply Division P.O. Drawer 2481, Tulsa 2, Okla. and the J & L Store in YOUR field.

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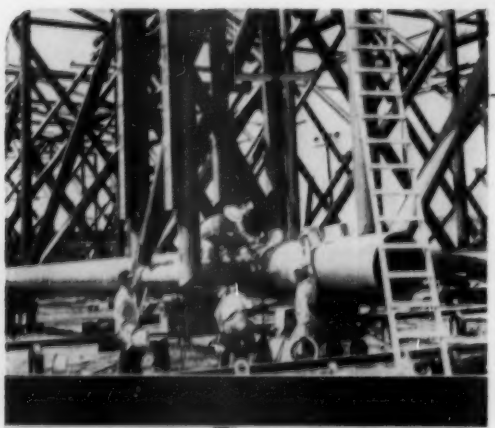
Avondale...

now 4 divisions

serving the Oil Industry



What with the ever increasing off-shore oil activity, the 4 divisions of Avondale become relatively more important as services to the Oil Industry! In truth, the 4 divisions comprise a team to serve the Oil Industry—every phase of it, from production to refining. Service Foundry Division—casting, gear cutting, machine work. Harvey "Quick Repair Plant"—drydocking, expert propeller service. Main Yard—steel fabricating, ship, barge, towboat building, and repairs. Avoncraft Division—Porcelain Enamel Service Stations.

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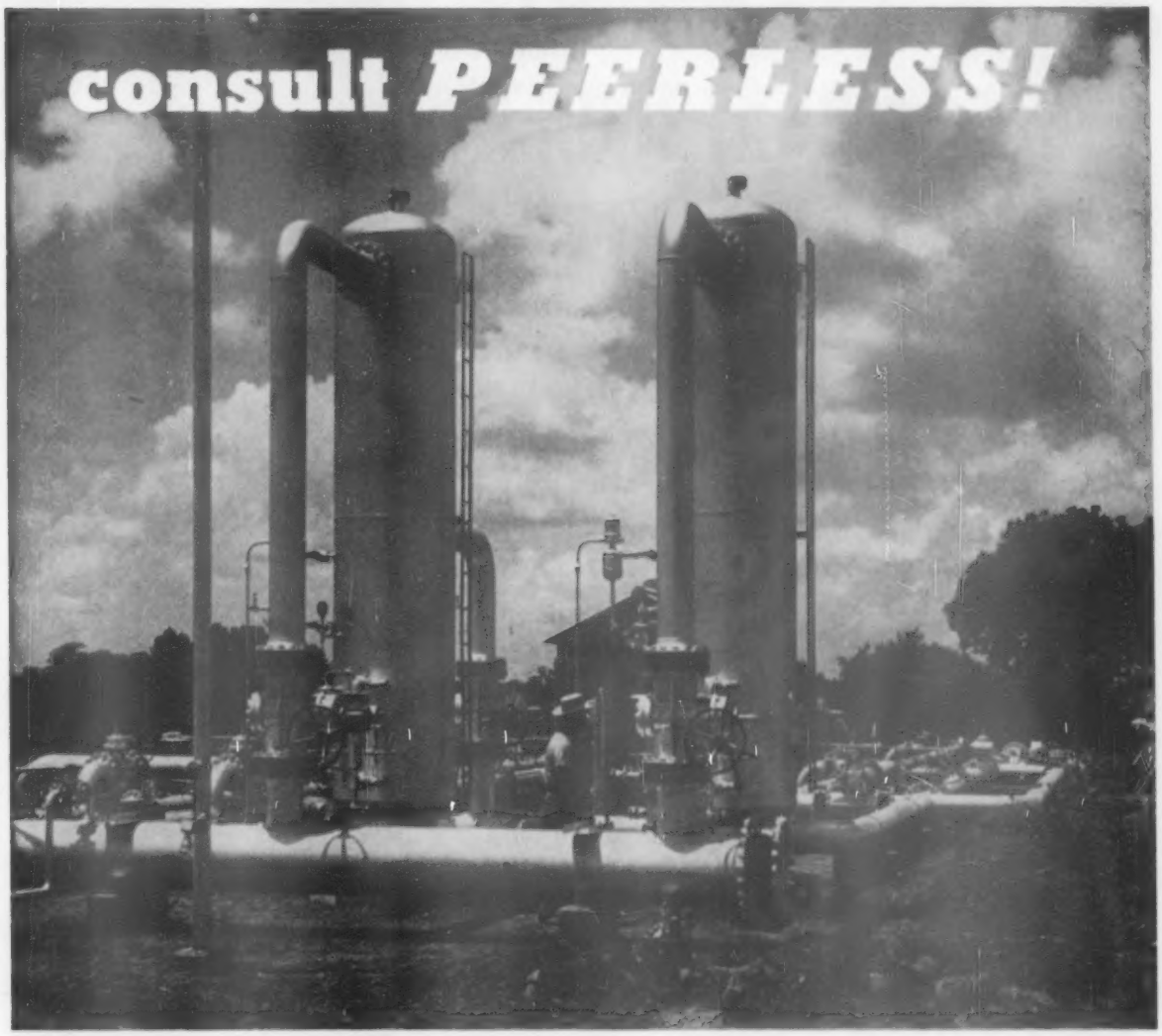

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Pictured is an installation of TWO 42" x 15' Peerless Gas Scrubbers, at a new Pipeline Compressor Station, in Louisiana. This installation is typical of the many successful applications of Peerless Scrubbers.

Each Peerless Scrubber is designed and built around the famous Peerless Mist Extractor Unit, which guarantees the liquid entrainment loss to be less than 1/10 gallon per million standard cubic feet of flowing gas.

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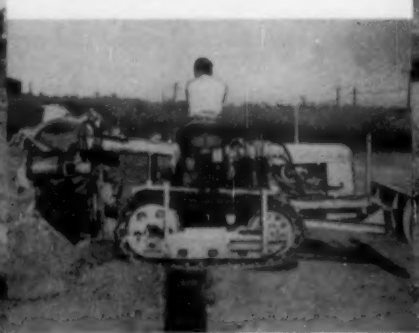
STREET ASPHALT IS NO PROBLEM

HOLDS LINE AND GRADE WITHOUT EFFORT

TRENCHES EASILY IN SMALL SPACE . . . NEAR BUILDINGS, etc.

SQUARE TRENCHES

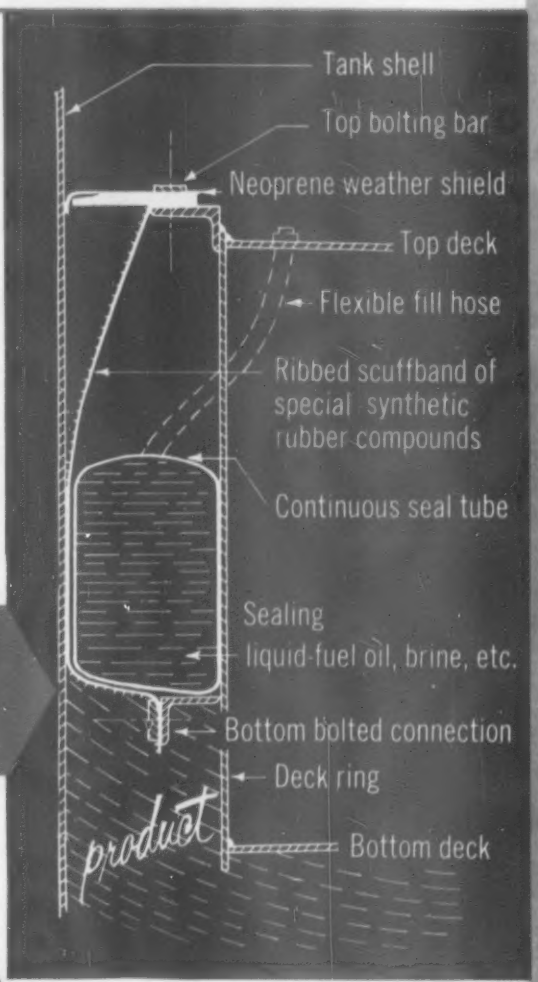


CROSS TRENCHES

PIPE LINE STRIPPING

Think of what this means to operators of FLOATING ROOF TANKS!

Elimination of potential vapor-loss and preservation of product quality, the most important reasons for a floating roof tank, are now reality . . . the **HAMMOND TUBESEAL,*** for floating roof tanks of welded or riveted construction, provides the most efficient and positive seal known . . . sealed at a point to prevent vapor space between roof, rim and shell, thus there is no room for vapors to form or for the product to come in contact with outside influences and be contaminated . . . the **TUBESEAL*** has no moving parts, requires no maintenance, adjusts for tank out-of-roundness, is climate proof and non-corrodible, can operate to bottom of tank or above the top . . . **ITS ENTIRE CIRCUMFERENCE IS TIGHTLY SEALED UNDER PRESSURE AT ALL TIMES . . . NO VAPOR SPACE BELOW THE SEAL.**



THERE'S NO ROOM FOR VAPORS TO FORM WITH THE HAMMOND TUBESEAL

THE **HAMMOND TUBESEAL*** HAS BEEN THOROUGHLY TESTED IN COMMERCIAL USE . . . IT IS **GUARANTEED** TO YOUR SATISFACTION.

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More than 24,000 carloads of Basalt-Kaiser steel line pipe have been shipped to meet the time tables of major pipeline projects across the nation during the past four years.

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Add to this our *uniform quality, wide range of sizes,* and *prompt service* and it's clear why pipeline companies know they can rely on Kaiser Steel.

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KAISER STEEL PIPE SPECIFICATIONS • All pipe manufactured to latest A.S.T.M. and A.P.I. specifications

Type	Diameter	Length	Wall Thickness	Shipping Point
Continuous Weld—Threaded and Coupled	½" to 4" nominal I.D.	Uniform 21'	Standard	Fontana, Calif.
Continuous Weld—Plain End	2⅜" to 4½" O.D.	Up to 40'	Standard	Fontana, Calif.
Electric Resistance and Fusion Weld—Plain End	14" to 18" O.D.	Up to 40'	.250" to .500"	Napa, Calif.—Basalt-Kaiser
Electric Resistance Weld—Plain End	5⅝" to 12¾" O.D.	Up to 55'	.188" to .375"	Fontana, Calif.
Electric Fusion Weld—Expanded—Plain End	20" to 30" O.D.	Up to 40'	.250" to .500"	Napa, Calif.—Basalt-Kaiser

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SUCKER RODS
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Corrosive Fluid? If these are your pumping conditions, the Jones Type 1 sucker rod is your most efficient and economical choice. • This nickel alloy rod is fully normalized, precision threaded and shot peened to combine good load lifting strength, corrosion resistance and endurance. • Physical properties and other detailed information may be obtained by writing direct.

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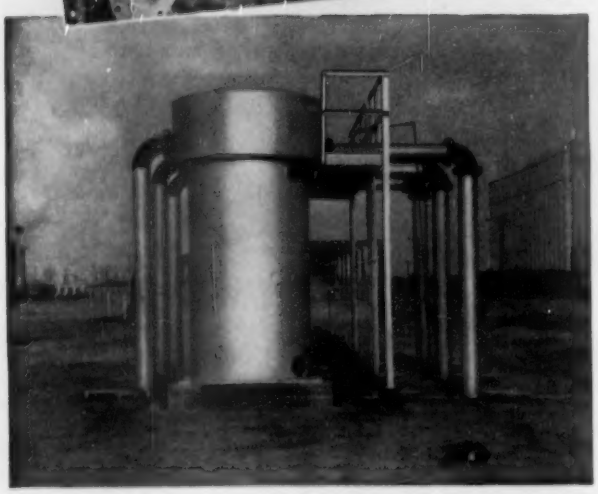
Dirty Water can't "Shut-down"...

Vogt

film type exchangers

(Condensers—Coolers—Evaporators)

Patent Nos. 1,935,270 - 2,057,597 - 2,424,441



River water, well water or brackish water are all alike to this exchanger *because it can be cleaned* while in operation! The water distributing ferrules need only be removed successively for the cleaning brush or tool whereby the tubes receive additional water which sluices away the dislodged dirt.

Vogt Film Type Exchangers are operating with real economy of first cost, operation and maintenance in power, petroleum, and chemical industries. They serve as Jacket Water Coolers, Feed Water Heaters, Hydrocarbon Evaporators, Sulphuric Acid Coolers, and Sulphur Dioxide Condensers, and can be designed to cool or heat any liquid and to condense or evaporate any fluid.

TOP: *Four units at Newton Falls, Ohio Municipal plant cool water for diesel engines and a lubricating oil cooler.*

BOTTOM: *Jacket Water Coolers serving engines of 7,300 HP in the compression plant of a Western Oil Refinery.*

[Bulletin HE-7 describes typical installations of Vogt Film Type exchangers and is available upon request.]

HENRY VOGT MACHINE CO., LOUISVILLE, KY.

Branch Offices: NEW YORK, CHICAGO, CLEVELAND, DALLAS, PHILADELPHIA, ST. LOUIS, CHARLESTON, W. VA.

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of the western oil country

Located at Pueblo, Colorado, the CF&I Seamless Tube Mill is ideally situated to provide prompt and efficient service to the oil and gas industries of the Rocky Mountain and Southwest areas.

Newest mill of its kind and first to be built west of the Mississippi, it incorporates the most modern fabricating facilities and advanced production and inspection techniques.

Combined with supervised control from blast furnace to finished product, these up-to-the-minute facilities assure you of seamless casing and tubing of the highest quality.

CF&I Seamless Oil Country Casing and Tubing meet API STD 5A specification and are available in sizes from 2⅜" O.D. through 9⅝" O.D.

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FREQUENCY STABILITY & SELECTIVITY
guaranteed for life!

And, your record of job performance is equally important! Protect it with the finest radio equipment obtainable. These industry leaders are successful because of their efforts to develop and use efficient trade tools. For reliable communications, each one immediately selected a General Electric 2-way mobile radio system. They gained the most dependable performance on the market today!

REMEMBER, G-E offers economy of operation too . . . dollar savings on maintenance you'll quickly recognize as superior to all other makes. Why not let a G-E Communications Counselor focus expert radio engineering know-how on your system requirements? Call him today at our local office or write: *General Electric Company, Section X825-14, Electronics Park, Syracuse, New York.*

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New 30,000 GALLON "SPACE-SAVER" *takes 30% less space*

ONLY acf OFFERS ALL THESE FEATURES

Complete Stress Relieving eliminates stresses set up during forming and welding . . . provides resistance to fatigue caused by temperature changes or pulsating loads.

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Hartford Steam Boiler Inspection in accordance with ASME 1952 Code W-XR-SR.

Steel Grit-Blasting of tank exteriors to remove mill scale, resulting in a smooth surface for red lead primer.

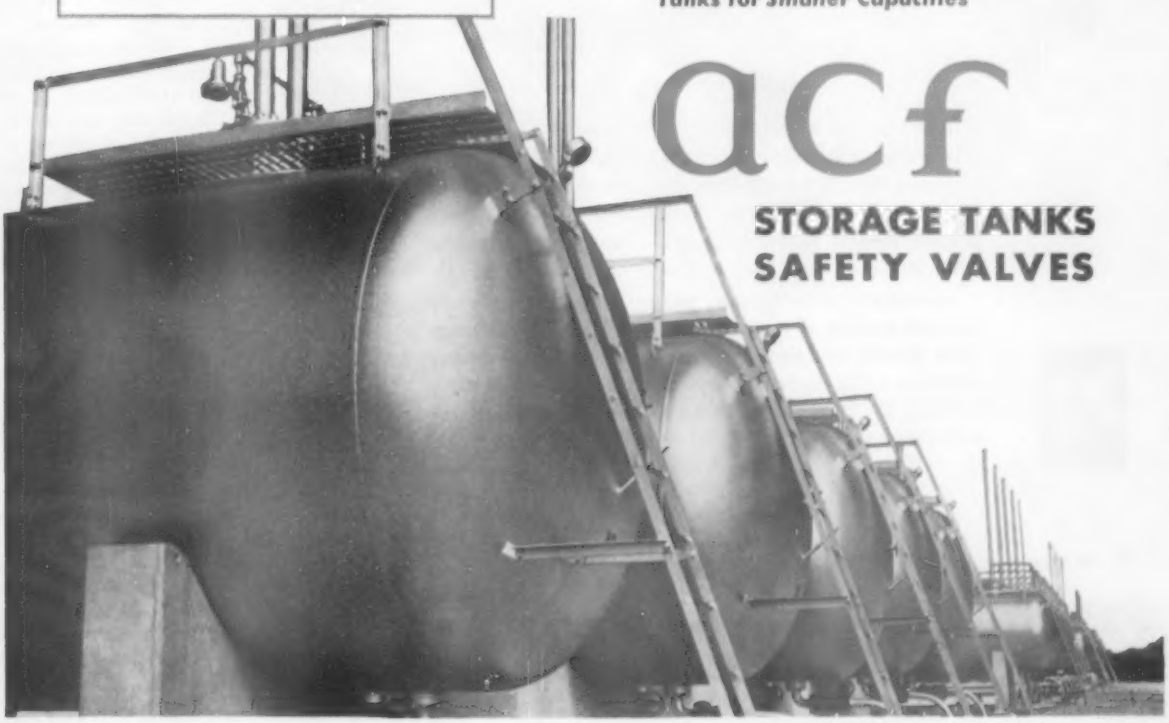
Manway for thorough internal inspections and cleanings.

Steel Saddles and Supports for installation on flat foundations are optional.

Newly designed acf Storage Tanks feature a 50-foot length . . . as compared against the usual 71-foot length of 30,000 gallon capacity tanks. These new larger diameter tanks require far less installation space . . . permit shipment on a single car . . . allow cross-loading on export barges. They weigh only 67,000 pounds, resulting in more economical shipping, rigging, handling, and installation.

acf Tanks are available for L-P gas, anhydrous ammonia, and other gases or liquids under pressure. For more specific details, write or call: Dept. 2-E, acf Industries, Incorporated, Industrial Products Division, 30 Church Street, New York 7, New York.

Proportionately Shorter Tanks for Smaller Capacities



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• It's wise to standardize with these WECO Compounds for tool joints and drill collars. Every gallon of these WECO Compounds has the same unvarying high quality—the same dependable assurance of proper thread lubrication and protection for string after string of drill pipe and drill collars.

Immediate availability, today and tomorrow, is another important reason why it's wise to standardize with WECO Compounds. Wherever you are—whenever you need them, you can always count on getting WECO NO-GALL and LO-TORK to protect tool joint and drill collar threads.

It's wise to standardize with... WECO

WECO WELL EQUIPMENT MFG. CORP. • Division of Chiksan Company • HOUSTON 1, TEXAS

They Say—

Jersey's Motives Questioned

"The producers operating in Texas and other oil-producing states are beginning to wonder how much reliance can be placed on individual companies when other companies do not exercise either individual or collective judgment. They are beginning to wonder whether this kind of 'individual' business judgment is good for the nation.

"Mr. Holman's (Eugene Holman, chairman of Standard Oil Co. of New Jersey) recognition of the domestic producers' problems isn't solving the problem. I would like to point out to Mr. Holman and to all of the oil-importing company officials that their interpretations of 'business statesmanship' is causing domestic-oil producers to lose faith in their motives. The importers have discredited business statesmanship. They have succeeded in making the term synonymous with futility . . . Their motivations have taken on a new and foreign accent as they have become companies of the world rather than of this nation. Their calls for individual business judgment should be weighed in the light of such action."

Russell B. Brown, General Counsel, Independent Petroleum Association of America, in a letter to I.P.A.A. members. His letter was aimed at the following statement made by Holman:

> "Development of foreign oil supplies by American companies contributes toward conservation of oil resources at home and assures foreign reserves in the event of an emergency. The problem of oil imports is of real concern to domestic producers, but we believe that a solution lies in the use of good business judgment by individual companies in the oil industry."

Ellenburger's Oil Column

Dear Sir:

I have read your article titled "Ellenburger . . . It's A Magic Word in West Texas" *(The Oil and Gas Journal, January 3, page 78).*

I enjoyed the article very much; you certainly did compile some interesting data. As you know, our company discovered the Deep Rock Ellenburger field in Andrews County and we are now completing our sixth well in the field. We have established an oil-water contact at a datum —9,200. This datum has been established by at least three wells in the field and therefore it is

...the straightest hole we've ever drilled, Jim!

REED

LET REED ROCK BITS HELP SOLVE YOUR CROOKED HOLE PROBLEMS

IT HAS long been an accepted fact that *two gauge cutter* rock bits have a decided tendency to drill straight hole.

Many drillers use a Reed Twin-Blast bit to straighten their crooked hole.

Many more use Reed bits at the start to help assure a straight, full gauge hole . . . free of offsets or dog legs.

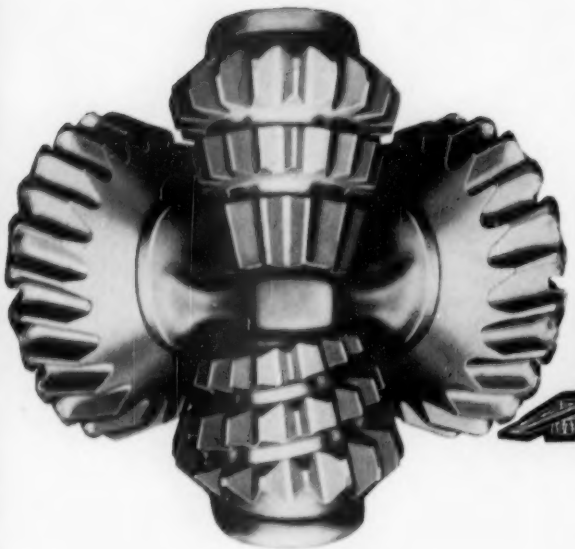
Ask a Reed salesman the "reason why."

REED ROLLER BIT COMPANY HOUSTON 1, TEXAS

SEE OTHER SIDE -

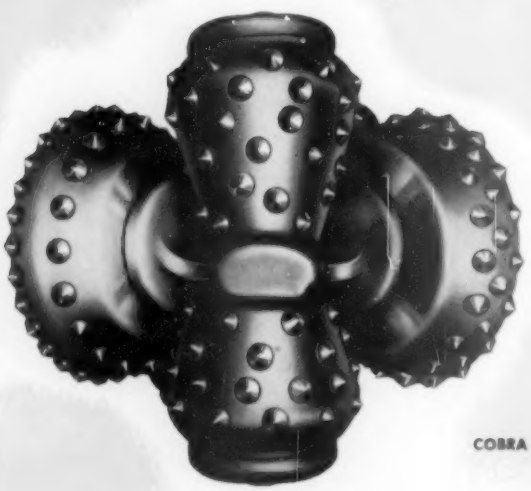
REED ROCK BITS

There is a REED VERTICAL HOLE drilling bit for any type formation



TWIN-BLAST

DMQ



COBRA

TWIN-BLAST Available in sizes 6⅛" through 13" for efficiently drilling straight hole in all types of formations.

DMQ This bit was designed for the harder and more frangible formations. Available in sizes 5⅝" through 11".

COBRA Designed to drill the extremely hard and brittle formations. Available in sizes 6¾" through 10⅝".

REED ROLLER BIT COMPANY

HOUSTON 1, TEXAS

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THE MARK OF QUALITY

Gulf Coast, Mid-Continent, Rocky Mountain and Canadian Distributor for Martin-Decker Products

considered reliable. The highest well drilled to date was the Ralph Lowe 1 Humble King, completed September 25, 1954, encountering the top of the Ellenburger at a datum —8,959; in other words having a gross oil section in the Ellenburger of 241 ft.

I noticed in your article you said that the Deep Rock field in Andrews County has less than 150 ft. of oil section above water in the highest well drilled. I did want to call this to your attention as approximately another 100 ft. of oil column makes a great deal of difference when it comes to calculating ultimate recovery.

C. L. Chase
Chief Geologist
Ralph Lowe
Midland, Tex.

Part of the Dry-Hole Lesson

"Near Bakersfield, Calif., the other day drilling crews for the Ohio Oil Co. abandoned the world's deepest well at 21,484 ft. . . .

". . . This California water hole is a two-million dollar demonstration of the fact that losses as well as profits are entailed in the oil and gas business. And this has a bearing on the Supreme Court's ruling treating the successful gas well as a public utility . . .

"Where the risk is great and the possible reward is subject to federal price fixing, there is bound to be reluctance on the part of investors to put money into the expansion of oil and gas reserves . . .

"It will appear much safer to put these costly and uncertain projects aside and sell only for consumption within the borders of the gas-producing states . . .

"When the consequences of federal meddling are wholly apparent, the states which hoped to benefit from price fixing may be expected to set up a howl of protest. Possibly they too would join then in asking Congress to make its intentions in this matter clear beyond peradventure."

Editorial in the Daily Oklahoman.

Handling Refinery Runs

"The early months of 1955 will probably see a continued buildup of gasoline inventories as we satisfy the high level of demand for distillates for heating during the motor-fuel off season. If distillate inventories are to be kept at efficient working levels, refinery runs must be stepped up, adding to top-heavy gasoline stocks unless distillate yields per barrel are boosted. Today's prices netting the refiner only 1¾ cents a gallon more for gasoline than for distillates should encourage the latter development, particularly since increasingly burdensome motor-fuel

Each Kel-F lined rupture disc is given a leak detector test and must be proven pin-hole free.

The large stock of controlled ductile metals used in the manufacture of BS&B rupture discs enables us to duplicate a previous requirement as well as affording you a wide selection in pressures — from 5 to 50,000 lbs.

For CORROSIVE Conditions

Equip Your SAFETY HEADS With BS&B Kel-F Lined Rupture Discs!

Whenever BS&B Safety Heads are installed in a location where corrosive conditions exist, an unprotected metal rupture disc may be vulnerable to corrosive attack from either the product or the atmospheric side—or both.

The recommended disc to use under these circumstances is the BS&B Kel-F lined rupture disc, which has for more than 3 years proven its resistance to corrosive attack from strong acids, caustics, chlorine, etc. Kel-F is a trade name for a thermo-plastic film of trifluorochlorethylene, which is also known by the trade name of Trithene. Discs may be specified with the Kel-F lining on either or both sides, as your conditions may require.

The use of Kel-F linings in combination with metals of known mechanical and metallurgical qualities such as Inconel, Monel, stainless steel and nickel means positive, trouble-free protection in highly corrosive applications heretofore impossible.

Thus, through "know-how" attained by years of experience in this highly technical field, BS&B has again provided the Process Industries with a *better* safety device for the protection of closed pressure systems!

BS&B Safety Heads

For full information on the BS&B Kel-F lined rupture disc and its application to your specific problem, consult your BS&B Office or Representative . . . or write to us direct.

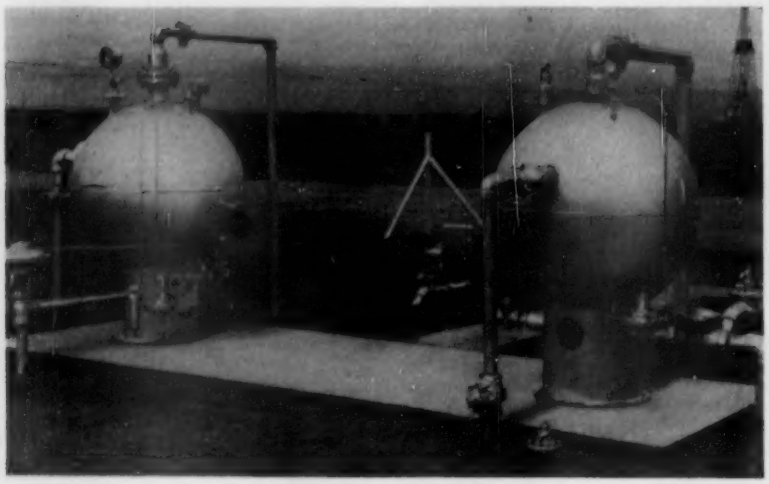
THE "CIRCUIT-BREAKER" OF *Any Pressured System*

BLACK, SIVALLS & BRYSON, INC.
Safety Head Division, Dept. 2-A1
7500 East 12th St., Kansas City 26, Mo.

EFFICIENCY OVER 60 YEARS BS&B RELIABILITY

SIVALLS SPHERICAL SEPARATORS

Patent Pending.



Two stage separation, Ellenburger Trend, West Texas

Well engineered, thoroughly tested and easy to hook up, Sivalls Spherical Separators utilize key factors in oil and gas separation.

- They have proved efficient, versatile and economical in the field for single and multiple stage service and as skid and trailer mounted test units.
- The sphere is particularly well suited for oil and gas separation because of the ease of maintaining tangential flow, large oil-gas interface, and maximum volume and working pressure per unit of weight.
- Write for Catalog 200—Sec. 5.

SIVALLS TANKS, INC.

General Offices:
Box 1152 ● Odessa, Texas

Sales and Service Points:
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San Angelo 4796 ● Midland 2-4558 ● Hobbs 3-6223

Southwest Texas Distributor:
Engineering Service Co., Corpus Christi, 3-4489

inventories would put further pressure on already soft gasoline prices."

H. M. S. Burns, president, Shell Oil Co., in an address before the Boston Security Analysts Society.

He Laughed With Us

Dear Sir:

I was quite amused by the cartoon appearing on page 164 of your January 3 issue. I would like to use a reprint of this in the next issue of our Allied Party Line. May I have your permission? Full credit, of course, will be given.

G. R. Wyatt
Editor
Allied Materials Corp.
Oklahoma City, Okla.

Editor's Note: We are happy to hear you share our humor, and we want others to laugh with us.

The Big Threat

."So long as it operates in the shadow of natural-gas regulation, the petroleum industry, along with other competitive industries as well, is under perhaps an even greater threat. That threat, if not removed, may lead eventually to federal regulation not only of the entire oil industry but of other competitive, producing industries such as coal and other minerals, agriculture, and lumbering . . ."

K. S. Adams, chairman of the Board, Phillips Petroleum Co., in the January issue of Philnews, Phillips publication.

CALENDAR OF EVENTS

FEBRUARY

16-18 National Association of Corrosion Engineers, sixth annual short course for pipeliners, Mayo Hotel, Tulsa.

23-24 Pacific Coast Gas Association, seminar on electronic data processing, Los Angeles.

25 National Gasoline Association of America, Permian basin regional meeting, Scharbauer Hotel, Midland, Tex.

MARCH

1-2 American Gas Association committee on natural gas reserves, Baker Hotel, Dallas.

1-2 Fourth Symposium on Subsurface Geology, University of Oklahoma School of Geology and Oklahoma Geological Survey, Oklahoma Memorial Union Building, Norman, Okla.

4 Southern Gas Association, transmission management conference, Shamrock Hotel, Houston.

7-11 National Association of Corrosion Engineers, Palmer House, Chicago.

9-11 American Petroleum Institute, Division of Production, Southwestern spring meeting, Jung Hotel, New Orleans.

17-18 Southern Gas Association, Distribution Management Conference, Jung Hotel, New Orleans.

Here's why BOWER straight roller bearings can carry maximum loads—with less maintenance!

The important design features of Bower straight roller bearings shown on this page are just a few of the reasons why these bearings will operate efficiently and economically in your product. Consider these facts, too. Bower straight roller bearings incorporate highest quality materials and workmanship. They have proved themselves capable of standing up day in and day out under maximum loads—with little or no maintenance.

In fact, this is the reason why Bower straight roller bearings are used extensively by leading manufacturers in such fields as automotive, earthmoving, farm equipment and machine tool.

Let a Bower engineer give you full details of the complete Bower line. Call him in while your product is still in the blueprint stage.

BOWER ROLLER BEARING COMPANY • DETROIT 14, MICHIGAN

● *TWO-LIP RACE INCREASES RIGIDITY.* These two shoulders, made parallel, are integral with the outer race. This provides a more rigid, durable construction. Rollers are kept in proper alignment at all times.

● *COMPOSITE STEEL CAGE DOES NOT CONTACT ROLLERS DURING NORMAL OPERATION,* thereby allowing free movement of the rollers between the races. Projections on the inner faces of the rings engage indentations on the roller ends preventing the rollers from dropping out of position when the separable race is removed.

● *PRECISION-BUILT ROLLERS AND RACES ARE MADE TO SUPPORT MAXIMUM RADIAL LOADS.* Only the highest grade steel-alloy is used, and rollers and races are precision ground to give quieter, smoother operation. Running clearance is built in at the time of manufacture.

A COMPLETE LINE OF TAPERED, STRAIGHT AND JOURNAL ROLLER BEARINGS FOR EVERY FIELD OF TRANSPORTATION AND INDUSTRY

BOWER
ROLLER BEARINGS

SPHER-HONED

"Buffalo" Type "EWC" Evaporative Water Cooler with Recirculating Dampers for Automatic Temperature Control.

OUR WATER RESOURCES

PRICELESS

"Buffalo" TYPE "EWC" EVAPORATIVE WATER COOLERS WILL GIVE YOU MAXIMUM HEAT EXCHANGE ON A MINIMUM OF MAKEUP WATER

Liquid to be cooled passes thru finned coils in these compact, efficient units. Cooling is caused by evaporation of fine spray on the coils, under draft. Make-up water requirements are very small. Here is the practical answer to water consumption in cooling liquids — compressor jacket water — lubricating oils — quench oils — Diesel, natural gas and other engine jacket water — all in a closed system that keeps impurities out. "Q" Factor* features in "EWC" Units include quality "Buffalo" Fans and Pumps, and heavy-duty 3-section cabinet for easy installation and maintenance. Write today for Bulletin 3666A!

The "Q" Factor — the built-in Quality which provides trouble-free satisfaction and long life.

BUFFALO FORGE COMPANY

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Publishers of "FAN ENGINEERING" Handbook

Canadian Blower & Forge Co., Ltd., Kitchener, Ont.

Sales Representatives in all Principal Cities

VENTILATING AIR CLEANING AIR TEMPERING INDUCED DRAFT EXHAUSTING
FORCED DRAFT COOLING HEATING PRESSURE BLOWING

20-23 American Institute of Chemical Engineers, Kentucky Hotel, Louisville.

23-24 Pacific Coast Gas Association, accident prevention conference, Santa Barbara, Calif.

23-25 American Petroleum Institute, Division of Production, Mid-Continent District, Herring Hotel, Amarillo, Tex.

26 North Texas Oil and Gas Association twenty-fifth annual meeting, Wichita Falls, Tex.

27-29 Texas Independent Producers and Royalty Owners Association, ninth annual meeting, Hotel Texas, Fort Worth.

28-30 Western Petroleum Refiners Association, 43rd annual meeting, Plaza Hotel, San Antonio.

28-31 American Association of Petroleum Geologists, Society of Exploration Geophysicists, and Society of Exploration Paleontologists and Mineralogists, annual meeting, Hotel Statler, New York.

28-April 1 American Society for Metals, 9th western exposition and congress, Pan American Auditorium, Los Angeles.

30-April 1 17th annual American Power Conference, sponsored by Illinois Institute of Technology, Sherman Hotel, Chicago.

APRIL

4-5 Wilcox Trend Symposium, Eighth Oil Recovery Conference, Texas Petroleum Research Committee, Texas A. & M. College, College Station, Tex.

5-7 Corrosion control short course, sponsored by University of Oklahoma and Central Oklahoma Section of National Association of Corrosion Engineers, University of Oklahoma Extension Study Center, Norman, Okla.

7-8 Rocky Mountain District, American Petroleum Institute, Division of Production, Gladstone Hotel, Casper, Wyo.

13-15 Natural Gasoline Association of America, annual convention, Baker and Adolphus hotels, Dallas.

13-15 American Society of Lubrication Engineers, tenth annual meeting, Hotel Sherman, Chicago.

13-15 National Petroleum Association, 52nd semiannual meeting, Cleveland Hotel, Cleveland.

18-20 American Society of Mechanical Engineers, spring meeting, Lord Baltimore Hotel, Baltimore.

19-20 Pacific Coast Gas Association, distribution conference, Phoenix.

19-21 Southwestern Gas Measurement Short Course, North Campus, University of Oklahoma, Norman, Okla.

20 American Society for Testing Materials —DCC, Kansas regional group meeting, Broadview Hotel, Wichita, Kans.

20-22 Petroleum Industry Electrical Association, annual conference, Shamrock Hotel, Houston.

24-27 American Society of Mechanical Engineers, Region VIII engineering conference, Rice Hotel, Houston.

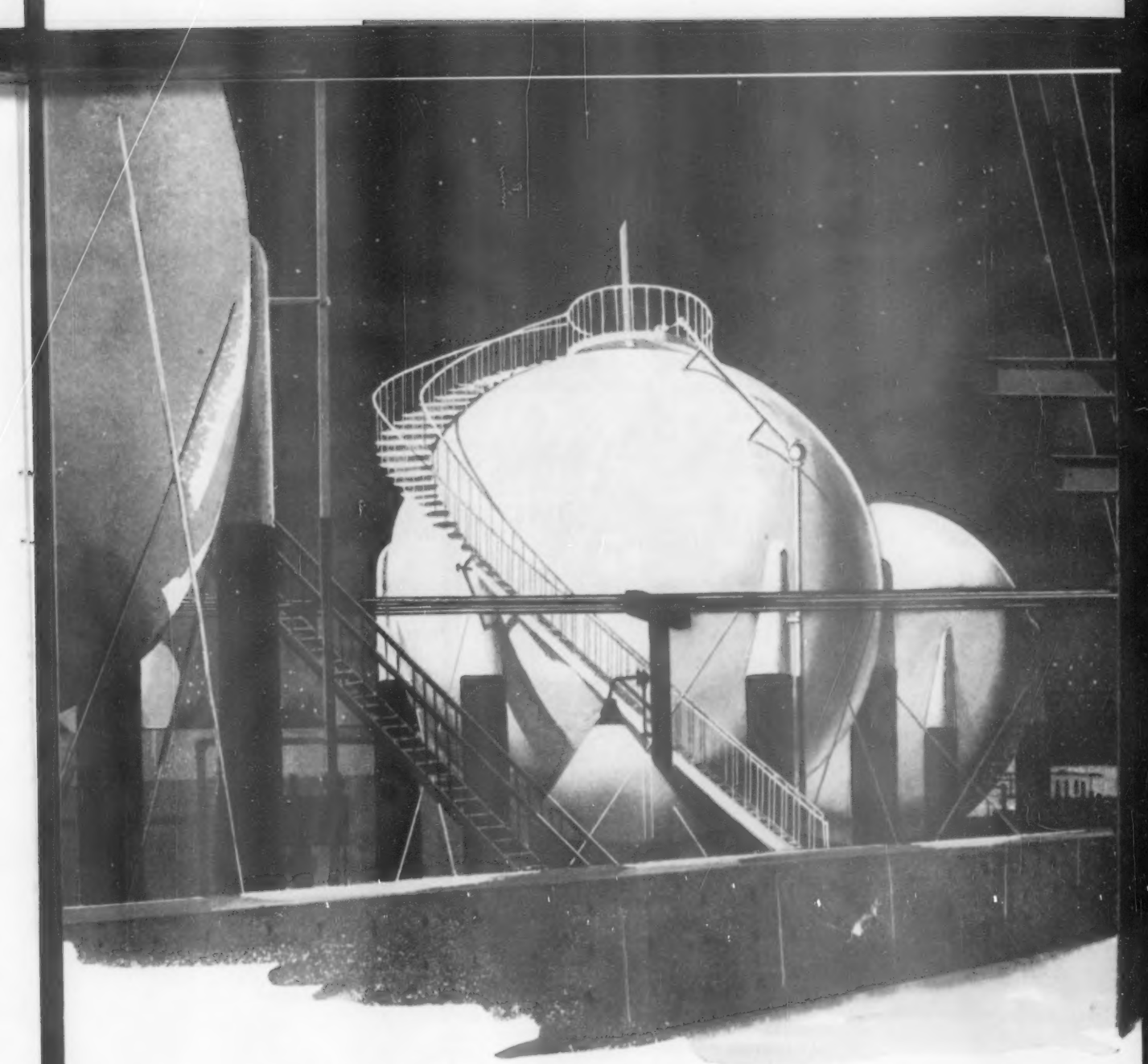
25-26 Independent Petroleum Association of America, midyear meeting, San Antonio.

28-29 American Petroleum Institute, Division of Production, spring meeting of Pacific Coast district, Statler Hotel, Los Angeles.

29-30 American Association of Petroleum Landmen convention, Hilton Hotel, Fort Worth.

MAY

1-4 Liquefied Petroleum Gas Association, annual convention, Conrad Hilton Hotel, Chicago.



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and Beacon Petroleum Company

The successful marketing of today's petroleum products depends upon an experienced organization. Behind Beacon are years of successful operation... your assurance of dependable service.

If you have Butane-Propane, Deisel Fuel, Natural Gasoline or any other petroleum products to sell contact Beacon . . . or if you want to buy any petroleum products . . . contact Beacon.

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HERE'S WHY

PENBERTHY

GAGE VALVES

ARE YOUR BEST BUY!

Long, Trouble-Free Service Built-In

PENBERTHY TYPE 300 STANDARD LIQUID LEVEL GAGE VALVE "DU-LUX" BLACK ENAMEL FINISH

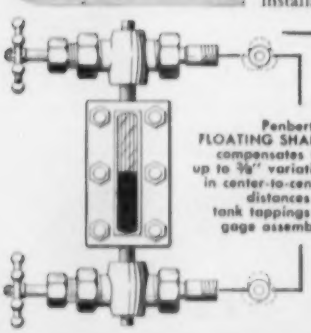
- A Steel Locknut
- B Identification Plate
- C Steel Wheel or Lever
- D Steel Stem Packing Nut
- E Stainless Steel Standard or Quick-Closing Stem
- F Stainless Steel Packing Gland
- G High Temperature Resisting Stem Packing
- H Stainless Steel Stem Packing Retainer
- I Forged Steel Body
- J Stainless Steel Ball
- K Stainless Steel Ball Retainer
- L Patented "Floating Shank"
- M Steel Tailpipe
- N Steel Coupling Nut

UNION GAGE CONNECTION models permit removal of gage without disturbing valves or draining system.

PLUS... AT NO EXTRA COST... EXCLUSIVE FLOATING SHANK

No other gage valve has all of the quality features of a Penberthy. Features that add up to top performance at lowest cost. You can see that for yourself in the "exploded" view of a Penberthy valve.

In addition, the FLOATING SHANK is a time and labor saving feature that cuts installation and replacement costs by 50% or more. It also eliminates strain, caused by a forced installation, with its subsequent danger to the entire installation.



Penberthy FLOATING SHANK compensates for up to ⅜" variation in center-to-center distances of tank toppings or gage assembly.

Try Penberthy Gage Valves on your next installation. See for yourself why they are your best buy. Obtain them through your local supplier or direct. WRITE for Catalog No. 35 showing the complete line . . .

PENBERTHY INJECTOR COMPANY

Division of the Buffalo-Eclipse Corporation

1242 HOLDEN AVENUE • DETROIT 2, MICHIGAN

- GAGES
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- EDUCTORS
- EXHAUSTERS
- SYPHONS
- ELECTRIC SUMP PUMPS
- CYCLING JET PUMPS
- INJECTORS

There's Certain Satisfaction in Products by PENBERTHY

1-4 American Institute of Chemical Engineers, Shamrock Hotel, Houston.

9-10 American Gas Association, Gas Supply, Transmission and Storage Conference, Hotel William Penn, Pittsburgh.

9-12 American Petroleum Institute, Division of Refining, midyear meeting, Jefferson Hotel, St. Louis.

11-12 Pacific Coast Gas Association, gas supply and transmission and conference of technical session, Palm Springs, Calif.

11-13 American Petroleum Institute, Division of Production, Eastern District spring meeting, William Penn Hotel, Pittsburgh.

12-19 Sixth Latin American Congress of Chemistry, Caracas, Venezuela.

14-22 World Wide Chemical Plant and Equipment Exposition and Congress, Frankfurt, Germany.

16-18 American Petroleum Institute, Division of Transportation, products pipeline confrence, Edgewater Beach Hotel, Chicago.

16-18 Southern Gas Association, New Orleans.

20-22 Appalachian Geological Society, Virginia Geological Survey, and West Virginia Geological Survey, spring field conference, Kavannaugh Hotel, Harrisonburg, Va.

23-25 American Petroleum Institute, Division of Marketing, midyear meeting, Chase and Park Plaza hotels, St. Louis.

26-27 Kentucky Oil and Gas Association, annual meeting, Lafayette Hotel, Lexington.

30-June 1 Chemical Institute of Canada, thirty-eighth annual conference and exhibition, Quebec City, Que.

JUNE

1-3 Tenth annual Short Course on Gas Technology, Texas College of Arts and Industries, Kingsville, Tex.

5-9 Canadian Gas Association, annual meeting, Sheraton-Broeck Hotel, Niagara Falls, Ont.

6-9 Oil and Gas Power Division, American Society of Mechanical Engineers, 27th annual conference and engineering exhibit, Hotel Statler, Washington, D. C.

6-10 American Petroleum Institute, Division of Production, midyear committee conference, Brown Palace Hotel, Denver.

6-15 Fourth World Petroleum Congress, Rome, Italy.

9-10 Natural Gas and Petroleum Association of Canada, Royal Connaught Hotel, Hamilton, Ont.

9-10 Pennsylvania Grade Crude Oil Association, annual meeting, Hotel William Penn, Pittsburgh.

11-15 Petroleum Equipment Suppliers Association, annual meeting, Banff Springs Hotel, Banff, Alberta, Canada.

12-17 Society of Automotive Engineers, golden anniversary summer meeting, Chalfonte-Haddon Hall, Atlantic City, N. J.

16-18 Interstate Oil Compact Commission, Cosmopolitan Hotel, Denver.

20-23 American Society of Mechanical Engineers, semiannual meeting, Statler Hotel, Boston.

23-26 Rocky Mountain Oil Show, Casper, Wyo.

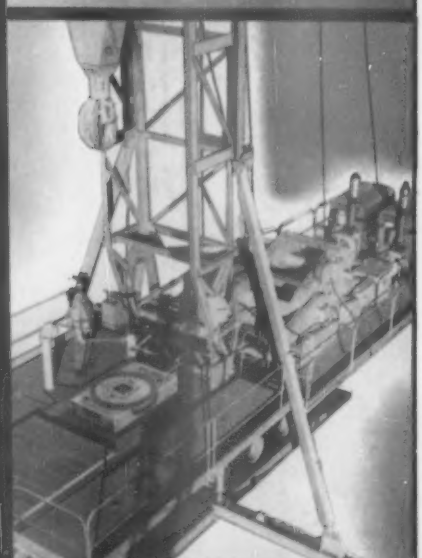
26-July 1 American Society for Testing Materials, Chalfonte-Hadden Hall, Atlantic City, N. J.

AUGUST

15-17 Society of Automotive Engineers, golden anniversary West Coast meeting, Hotel Multnomah, Portland, Ore.

IDECO

Dual Rambler



NEW, FAST-MOVING

Guyless

MONEY-MAKER

Go-getting 2-trailer rig has greater capacity . . . . . maximum portability!

Already proving its advanced design in the field, this new king-size version of the world-famous Ideco *Ramblers* packs the power to drill "slim-hole" to 9,000 feet and a 105-foot GUYLESS mast into 2 compact *8-foot road-width trailers*. Wide, unrestricted floor space and exceptional visibility means greater operational safety! Fast, uncomplicated rig-up means real money-making mobility! Write now, get the facts.

- **Folding walkways provide wide work area of 16 x 18½ feet!**
- **Excellent visibility with driller's controls at hoist or at mast leg!**
- **Time-proven mechanical "Lever-Lift" legs raise mast to vertical, then swing 90 degrees to become side stabilizers!**
- **Mast telescopes in vertical position . . . 105 ft. clear height from ground . . . 268,000 lbs. net hook load capacity. No external guys . . . only one pair of internal top guys attached to gooseneck of hoist trailer!**
- **Hydrair H-30, H-35, H-40 and H-525 hoists for economical medium drilling with 4½-inch drill pipe and deep "slim-hole" drilling or workover. Air controls, air-clutches, torque-converter drives. Chain or shaft-driven rotaries.**

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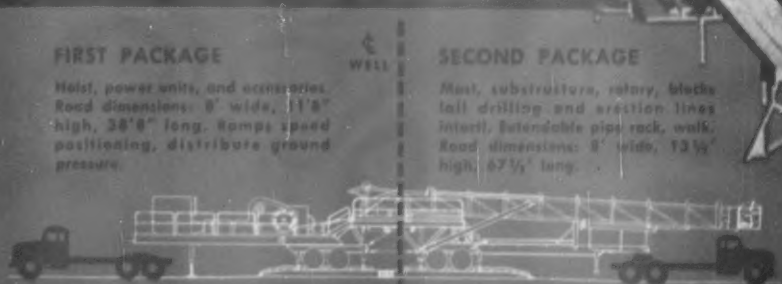
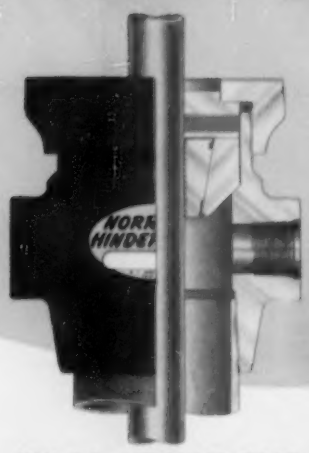

FIRST PACKAGE
Hoist, power units, and accessories. Road dimensions: 8' wide, 11'8" high, 38'6" long. Ramps speed positioning, distribute ground pressure.
SECOND PACKAGE
Mast, substructure, rotary, blocks (all drilling and erection lines intact). Extendable pipe rack, walk. Road dimensions: 8' wide, 13½' high, 67½' long.

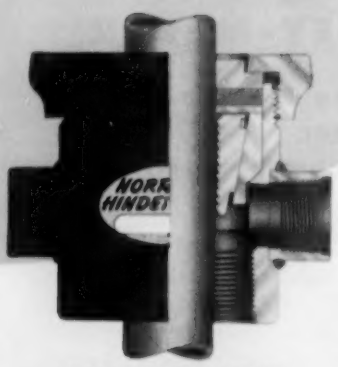
STASH COMPLETION TROUBLES

with

NORRIS-HINDERLITER *WELL* DEVELOPED WELL HEAD EQUIPMENT



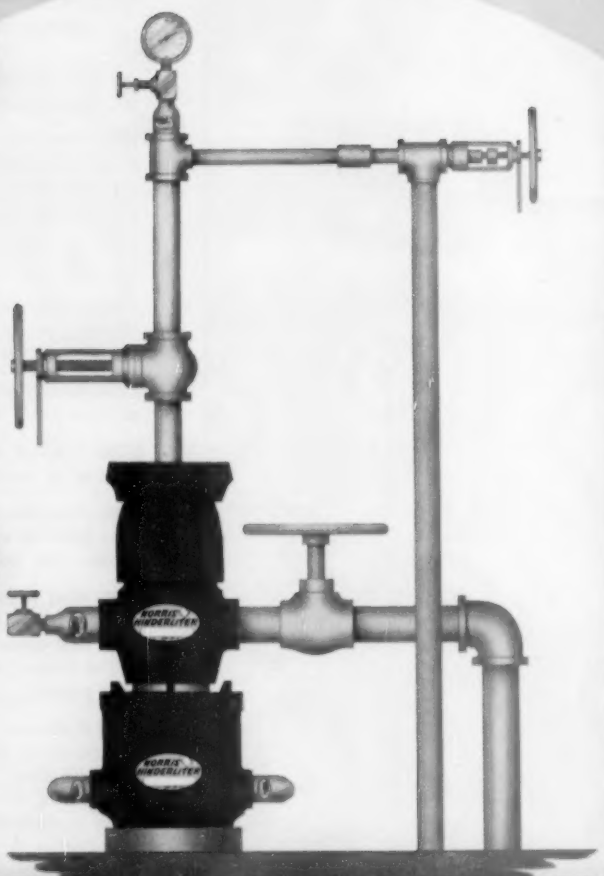
HW 2-in-1 TUBING HEAD
4000# Test Pressure
2000# C.W.P.



WCN TUBING HEAD
2000# Test Pressure
1000# C.W.P.

HW 4-in-1 TUBING HEAD
4000# Test Pressure
2000# C.W.P.

YLS CASING HEAD
2000# Test Pressure
1000# C.W.P.



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TULSA, OKLAHOMA

WEST COAST DISTRIBUTOR
REPUBLIC SUPPLY COMPANY OF CALIFORNIA
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Since NORRIS 1882

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EXPORT: 30 ROCKEFELLER PLAZA, NEW YORK CITY

the OIL AND GAS JOURNAL

TULSA, OKLAHOMA

Published every Monday by The Petroleum Publishing Co., 211 South Cheyenne Avenue, Tulsa, Okla. Phone 3-6291. Founded in 1902. Name changed to The Oil and Gas Journal in 1910 by Patrick C. Boyle.

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JOURNALLY SPEAKING . . .

Battleground

THE world may be shrinking for some people, but not for Dave Stormont, our West Coast editor. His world is getting bigger.

Dave used to be able to cover the entire petroleum empire west of the Continental Divide without stirring very far from home base in Los Angeles. But not any more. Now he has to keep a close eye on what's happening way up north in the Puget Sound country.

It's true that no oil or gas has been found up there yet. But that doesn't stop pipeliners and refiners. Their motto is: Oil is where you take it (gas, too). And right now they're taking a lot of both oil and gas to the Portland-Seattle-Vancouver region.

Dave was up there recently for a look-see. What he saw is reported in a special section in this issue.

Dave says that this region will be the scene of a big battle for markets among crude oil, products, natural gas, and electricity. He says energy requirements are growing fast and sources of supply may shift rapidly. Also that—but why should we tell you what Dave says? (Turn to page 107 and read it yourself.)

Counting Pages

JUST to get it on the record: Once again in 1954 our favorite oil publication carried more pages of advertising than any other magazine of any kind anywhere in the world.

Maybe you think it's getting monotonous to be told year after year that the Big Yellow Book leads all the rest. But our business office and our advertising salesmen don't get a bit bored at hearing it. They think it's rather nice.

Last year was a bit tough for advertising generally. Most publications—both business papers and popular magazines—dropped a few pages below 1953. We dropped a few ourselves, but not as many as some of our contemporaries, and the Journal's total of 7,535 pages of advertising was more than 500 pages above the runner-up, Iron Age.

Incidentally, many people don't realize that most years there are half a dozen business papers that carry more advertising than any of the most popular general magazines. That's because progressive American industries do a tremendous amount of buying to keep their plants up to date, and the leading publications in each field offer equipment manufacturers a concentrated audience of big buying power.

For that reason it might be interesting to note that the top-ranking publications in volume of 1954 advertising serve the petroleum, steel, machinery, electrical, electronics, and aviation industries. Those may not be the biggest industries in the country by all yardsticks, but the listing certainly suggests that these are among the most progressive, expanding, and fast-changing industries and therefore they provide the prime markets for more and better equipment.

So instead of getting into a fight with our advertising department over whether the Journal's No. 1 spot is due to good salesmanship or good editorial content, we'll simply say that it's a reflection of the aggressive nature of the industry we serve.

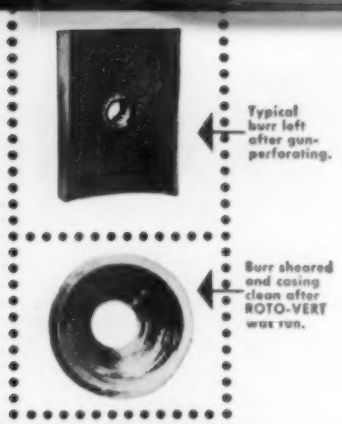
Feet Feat

A MAN in New York just walked 13 miles. That's news in this petroleum age. But this guy did it for fun. It was his last lap in a 502-mile hike over every street on Manhattan Island.

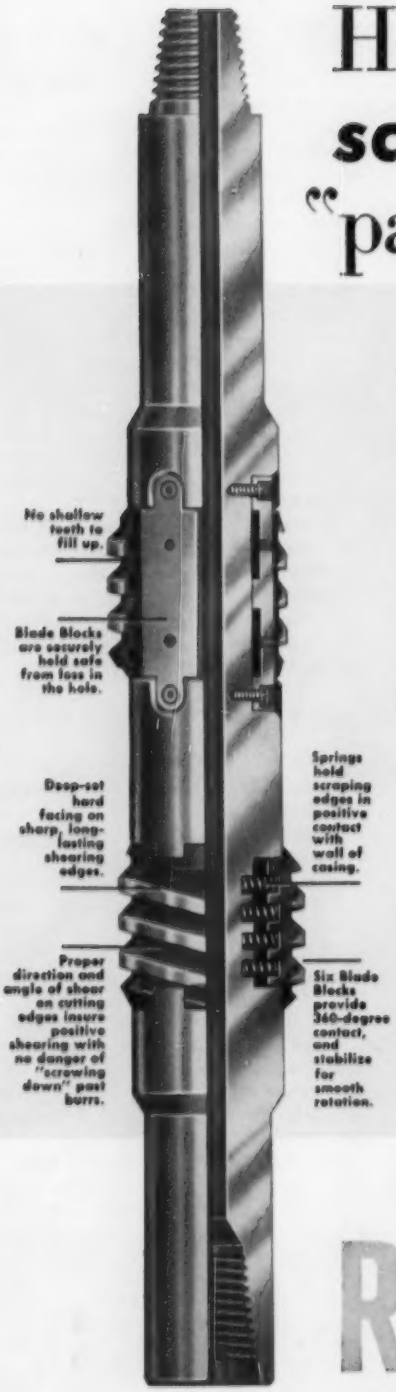
The automobile has just about made walking obsolete, at least outdoors. We have drive-in movies, restaurants, laundries, and even banks. Some people even ride motor scooters inside buildings. Hoboes hitch-hike, and even Boy Scouts take their "hikes" via truck. Future anthropologists, generations hence, may blame petroleum for degeneration of the human race's power of self-locomotion which they will trace back to circa 1950.

But some people still have to walk a little. One study says the average American man walks 9 miles a day, the woman 10 miles, the waiter 13, the policeman 18, and the high-school student 16. We don't know where that study was made. In our neighborhood the average high-school student doesn't walk any 16 miles a day; he can't go around the block without borrowing the family car.

—Henry D. Ralph.



Here's why
SCRAPING YOUR CASING
"pays off"


No shallow teeth to fill up.
Blade Blocks are securely held safe from loss in the hole.
Deep-set hard facing on sharp, long-lasting shearing edges.
Proper direction and angle of shear on cutting edges insure positive shearing with no danger of "screwing down" past burrs.
Springs hold scraping edges in positive contact with wall of casing.
Six Blade Blocks provide 360-degree contact, and stabilize for smooth rotation.

Unless the inside of your casing—the vital "working surface"—is clean and smooth, there is always a possibility of trouble in future operations. Burrs from gun-shot perforations, hardened cement or mud, and even mill scale are all dangerous when the time comes to run testers or swabs, or to set retainers or packers of any description.

The Baker Model "C" ROTO-VERT Casing Scraper removes undesirable obstructions from the inside of the casing, leaving it clean and smooth. Burrs or imbedded bullets are sheared away; cement, mud and scale are scraped away, so that any down-hole work can be safely done at once, or during the years to come.

SCRAPE WHILE DRILLING OUT

The ideal time to use the ROTO-VERT Casing Scraper is during the drilling out of cement, at which time it is run as a "follow-up" behind the bit. Thus in a single run you can also remove all hardened cement, mud, burrs and scale which might later damage swabs or testers, and cause packers or retainers to set prematurely—or never set at all.

EASY TO RUN—LOW-COST RENTAL

The Baker ROTO-VERT Casing Scraper is simple to run, and will effectively clean the inside of the casing *when either rotated or reciprocated* (vertical action). No service man is required, and the low rental cost is paid for many times over by freedom from future damage to bailers, swab rubbers and packers, as well as by the elimination of future delays and re-running expense.

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BAKER
ROTOVERT
CASING SCRAPER

PRODUCT NO. 620-C

In the Northwest and everywhere

THE Pacific Northwest is called the newest and most active battleground of the petroleum industry. That it certainly is. And as a case study, this area illustrates the competition that is going on in this industry everywhere—and also many other vital features of the business such as:

• *Boldness.* It takes a lot of guts to stake millions in pipeline and refining projects such as those in the Northwest. It's a blue chip game. The thinking has to be big, for halfway measures won't get results.

• *Rivalry.* Oil must compete with gas, and both with hydro-electricity. Canadian and San Juan gas must meet on equal terms. Canadian crude must fight it out with crude from California, South America, and Asia. The new refineries must wrest markets from products pipelines from the Rockies and waterborne products from California. Who said monopoly?

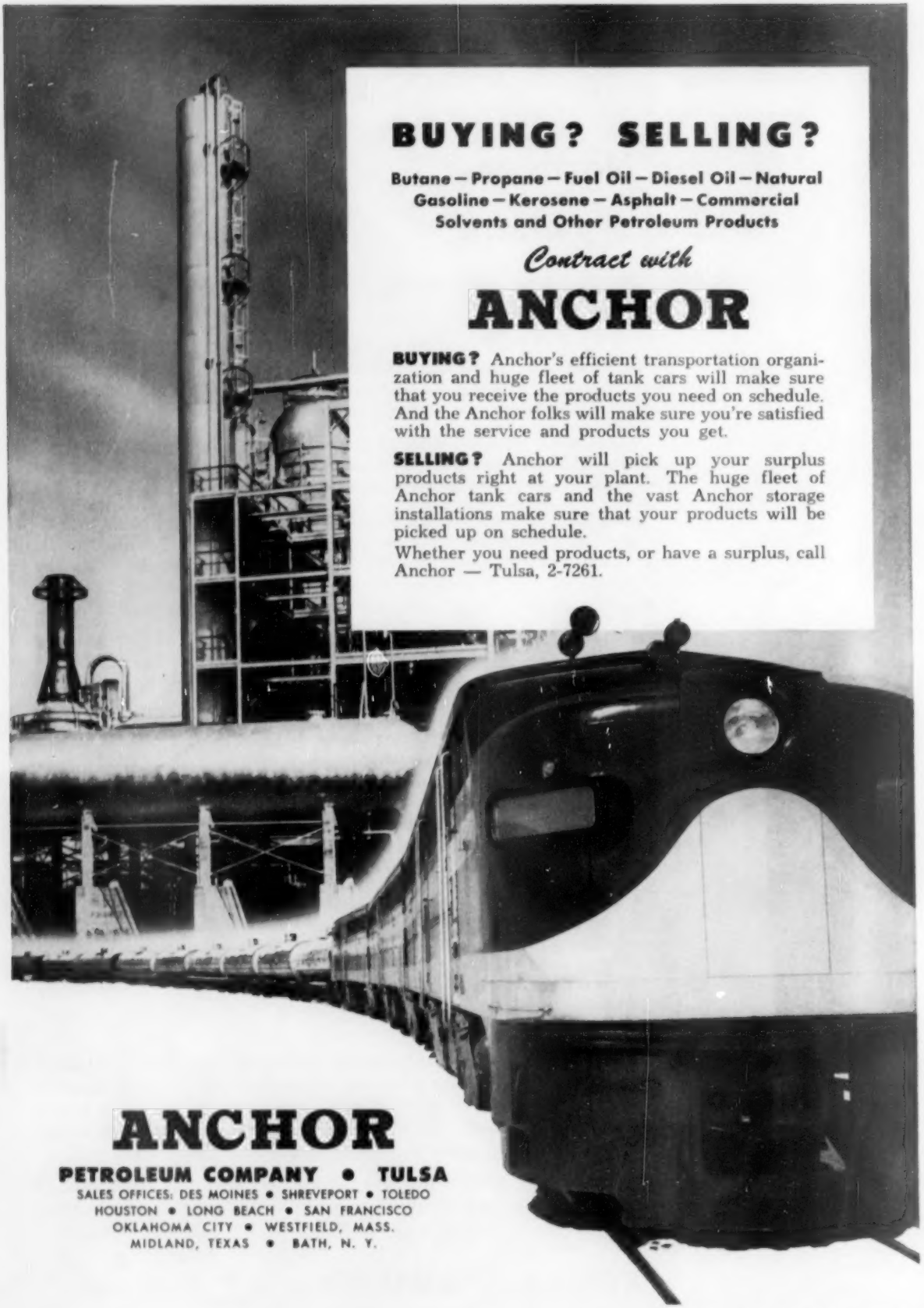
• *Long-range planning.* Today's activity is the climax of years of study, of shifting plans, of slow development. Projects like these don't spring full-blown over night. Nor do they pay out fast. Petroleum is no fly-by-night industry; it builds solidly and digs in for the long pull.

• *Chain reaction.* One thing leads to another. Rocky Mountain refiners pushed products lines west because their eastern markets were threatened by Williston basin discoveries. Expanding exploration in Alberta found the oil—then the gas—to support new pipelines. California's market for gas stimulated drilling in the San Juan basin which developed enough gas for a pipeline northwest. And so on. So an area with neither oil nor gas benefits from things that happened far away.

• *Interdependence.* Each area, each division of the industry, depends for its growth on the growth of the others. No one can go far alone. Production is futile without a pipeline, and vice versa. Exploration lags until a market is in sight. Refineries aren't built without good prospects of both supply and demand. It's an integrated industry in fact, regardless of corporate structure, and it has to cooperate in an integrated manner to get far.

• *Opportunity.* New developments will follow the projects already under way. More oil and gas fields will be sought—and doubtless found—near the new pipelines. New processing plants will be built, new towns grow, new markets created. Here is where independent operators fill in the pattern boldly sketched by the big capital behind the big projects.

The oil and gas developments in the Pacific Northwest are dramatic, but they're only a sample of what's going on in this business everywhere, all the time.



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THIS WEEK . . . . . IN THE NEWS

Exploration . . .

• Texas Panhandle gets first Ellenburger discovery. Phillips Petroleum strike in Gray County is 240 miles from nearest Ellenburger production in West Texas.

• Better methods to interpret seismic data will decrease the percentage of dry holes, leading geophysicists believe. Journal survey also stresses need for closer coordination between geologists and geophysicists.

Refining . . .

• Mid-Continent will add a 7,000-bbl. delayed coker at its 65,000-bbl. Tulsa refinery. Company plans to expand a cat cracker to 25,500 bbl. per day.

• Sinclair Refining soon to begin $30,000,000 expansion program at Houston and Marcus Hook. Houston program calls for new 24,000-bbl. reformer. Marcus Hook project will replace present crude stills with two 60,000-bbl. units.

• Falcon Petroleum and Farmington Funding Corp. will import Venezuelan crude for processing in Corpus Christi and Palestine. The two companies bought controlling interests in the refineries from Corpus Christi Refining Co.

• Succop Refinery Engineer Co., Los Angeles, will build a 5,000-bbl. refinery at Rapid City, S. D., for Great Plains Refinery & Development.

Natural Gas . . .

• President Eisenhower answers criticism of delay in cabinet committee report. He says its not deliberately held up, it's just complicated. Ike says water has been further muddied by Phillips case decision.

• House interstate commerce committee won't take up changes in Natural Gas Act until the middle of March at least. The committee will first consider the administration's health program.

• The first bill to override the Phillips decision reaches Congress. Industry is still reserving support for bill by Rep. Priest of Tennessee. He won't write his bill until cabinet committee reports.

International . . .

• First unit goes on stream at big Australian refinery. Remaining units will be in operation within 2 months, well ahead of schedule.

• Promising oil discovery on Italian mainland may swing sentiment in favor of more private-company exploration there. Gulf-Montecatini well, which produced 2,000 bbl. of oil per day on preliminary test, may usher in a new exploratory boom.

• Newly discovered field in Egypt may be largest yet in Gulf of Suez region. First well flowed about 1,150 bbl. of oil daily.

• Italian firm will build Venezuela's first nitrogen plant. Long-range plans call for series of petrochemical plants using Venezuelan gas.

Petrochemicals . . .

• Hydrogen from Great Northern's refinery and natural gas provided by Northern Natural will be used in an ammonia plant planned near St. Paul by St. Paul Ammonia Products Co. The $25 million plant, which will adjoin Great Northern's refinery, will go on stream in April 1956.

• Fluor Corp. has won the contract to build Calumet Nitrogen Products' ammonia plant near Hammond, Ind.

Imports . . .

• President Eisenhower dealt a body blow to those who want oil import quotas. The President said flatly in his press conference he would deplore any return to trade quotas.

• Esso Standard vice president says coal is a little mixed up. Diesel engines and natural gas should be the targets of the lagging coal industry, not imports of foreign oil.

• Residual imports are defended by Hugh A. Stewart, OGD chief. He says U. S. refiners could produce all our residual, but they'd want a better price. Besides he thinks our crude can be put to better use.

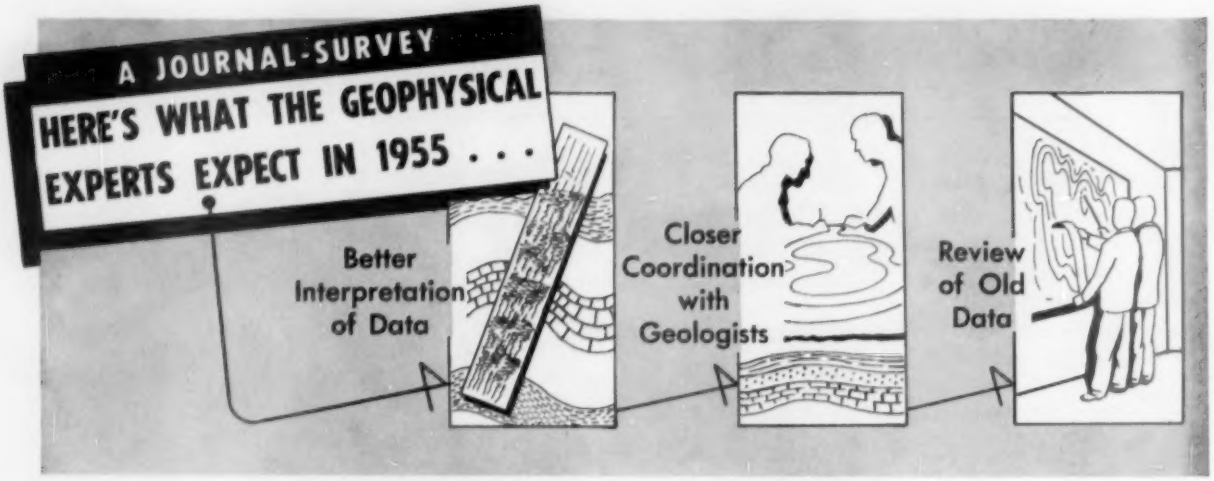
Labor . . .

• Negotiations between Canada's three big labor unions and the Pipeline Contractors Association are off to a smooth start and should lead to an agreement in March. Any agreement will cover all pipelining in the dominion.

• Field production workers of Far West Oil Co., Glenrock, Wyo., have voted to have the C.I.O. Oil Workers International Union represent them.

Pipelines . . .

• Westcoast Transmission plans to parallel most of its Peace River to Vancouver natural-gas line. The second line, which is several years in the future, will swing east rather than to the coast.


A JOURNAL-SURVEY
HERE'S WHAT THE GEOPHYSICAL EXPERTS EXPECT IN 1955 . . .
Better Interpretation of Data
Closer Coordination with Geologists
Review of Old Data

Better Seismic Interpretation Needed

- Experts agree this is the best opportunity to find more oil; better field techniques also would help
- Cost of geophysical work is up, but the outlay per discovery may drop; activity should increase in '55

Norman Morrisey

TULSA.—Geophysicists are convinced they can improve their skill in finding oil. Their formula calls for better interpretation of seismic findings and closer coordination with geologists.

A Journal survey of top geophysicists in scattered parts of the oil country shows they are keenly aware of the problems that confront them. Seismic activity is at a low ebb but may climb slightly this year. Costs are high and may get higher. Odds against finding new oil fields, especially those ranking as major discoveries, are gradually rising as new reserves are tapped and the most promising prospects explored.

But the future has its bright spots, too. Although the number of seismic crews has dropped in the past few years, the remaining crews are composed of more experienced and more competent men. Foreign activity should more than offset any immediate decline in domestic work. Costs, while high, have not risen any faster than in some other segments of the industry. Perhaps more important, good seismic work is still a bargain if it uncovers a major oil pool such as some of those found during the past year.

The Journal survey shows geophysicists are sure they can make seismic work an even bigger bargain.

Here, in order of importance, are factors which they think can improve their results:

. . . Improved interpretation methods.
. . . Better field techniques.
. . . More detailed shooting.
. . . Improved instrumentation.

Interpretation . . . Interpretation has not kept pace with instrumentation. Nearly 67 per cent of those suggesting a method of improving the use of seismograph listed better interpretation methods as the best opportunity. Twenty-three per cent listed this as the second best solution.

"In the future, precise and reliable interpretation work will command a premium," says Paul L. Lyons, president of the Society of Exploration Geophysicists. "Tremendous amounts of oil will be found in areas already explored by seismograph."

A similar forecast is made by Lynn Ervin, Oklahoma City consultant. "Careful, detailed supervision of current interpretation will greatly increase effectiveness of the seismic effort," he says.

Roy F. Bennett, Sohio Petroleum Co., Oklahoma City, points out that field technique and better instrumentation both depend on interpretation.

Instruments used in seismic work were given a vote of confidence by most of the industry leaders participating in the survey. Only 10 per cent of the persons answering questionnaires listed improved instrumentation as the best means to increase the efficiency of seismic crews and data. Most of the experts listed it either third or fourth in importance.

Coordination . . . Geophysics at its best demands close cooperation with geology. Or, as Lyons has expressed it, "The men who conceive such programs, in which geology and geophysics are intermixed, not 'coordinated,' will be the oil finders of the future."

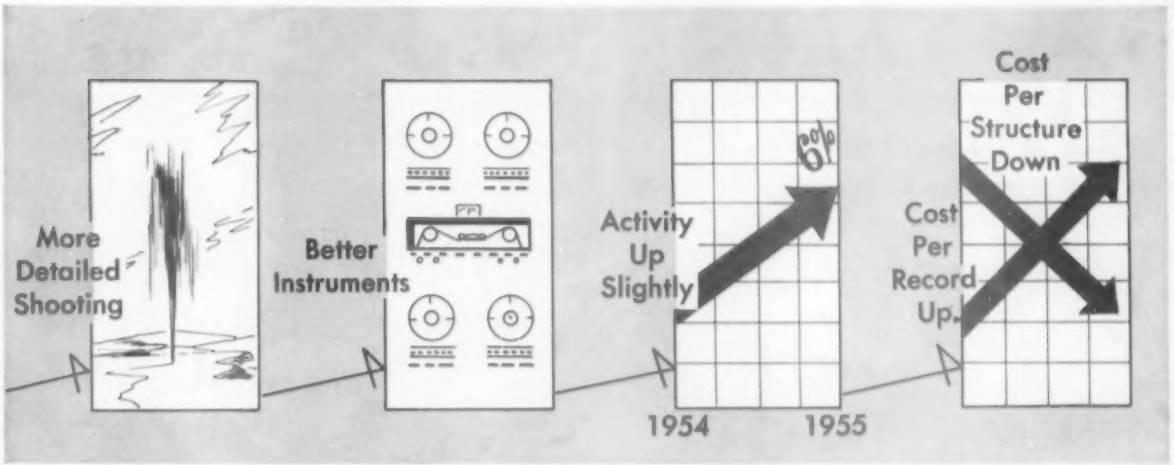
Interpretation, regarded as the greatest need of geophysics today, can best be improved by close relationship between the two sciences. Nearly half of those covered by the survey listed better coordination as the best way to improve interpretation of seismic data.

"Grading of seismic prospects has no value without inclusion of subsurface geology and economics in the particular area," says an official of one major company. "Only by close cooperation between every branch of petroleum exploration can an adequate value be placed upon an area."

"The subsurface geologist too often works in the dark and hangs prospects only on an active imagination," says another leading geophysicist.

Many oil companies have seen the need for a middle man between geology and geophysics and have employed coordinators. These "oil finders" have few administrative duties and devote their efforts to seeking new prospects. They draw from both sciences in seeking new leases, spotting well locations, and guiding future exploration.

Seaboard Oil Co., which only recently set up the post of coordinator, already is getting good results. British-



American Oil Producing Co. also has had success in this type of exploration. Major oil companies have found that coordination is a must in searching for new oil reserves.

Several other avenues also were suggested for improving interpretation:

. . . Review of old seismic data in the light of recent developments. This is one of the cheapest methods of finding oil which might have been overlooked previously.

. . . Better knowledge of regional and local geology.

. . . Permitting party chiefs to spend more time interpreting their findings and less time in administrative work.

. . . More detailed velocity control and more accurate velocity functions.

. . . More detailed shooting.

Cost trend . . . The cost of finding new oil structures has increased each year. Seismic exploration costs have risen about 30 to 40 per cent since 1946, but as one geophysicist points out, the jump has been no greater in seismic work than in many other operations.

J. J. Jakosky, Los Angeles, former president of the Society of Exploration Geophysicists, attributes increased costs largely to the following factors:

. . . Increased application of geophysics to the more difficult areas.

. . . The need for more detailed work in the areas of complex geology.

. . . Blind use of routine geophysical techniques somewhat regardless of the physical characteristics of an area.

Jakosky believes the curtailment in the use of seismic crews "is due to the old law of diminishing returns." In an area of complex geology, says Jakosky, field technique and instrumentation must be modified to produce best results.

"Although the cost per record will increase, the over-all exploration cost per structure discovered will decrease," he says.

The chief geophysicist for a major oil company blames geologists and management for misuse of geophysical work in areas of low oil potential. "Better geophysics in better areas should be the goal, rather than more shot holes for less money," he says.

Decline in operations . . . The trend toward more selective shooting already is apparent in the declining number of seismic crews in the field.

Seismic activities have dropped about 20 per cent in this country since the peak of 1952 when 710 crews were working.

Although this appears at first glance to be an alarming drop, it can be explained in the light of reduced production allowables.

The quickest place to trim the budget to compensate for the decline in revenue is in exploration. The expense of seismic work makes it sensitive to economic changes.

Actually, seismic operations seem to

Typical Seismic Discoveries in 1954

Dora Roberts Trend, Midland County, Texas
Pay zone: Ellenburger at 13,000 ft.
Discovery wells: Four successful wildcats have indicated a trend 17 miles long.

Amrow, Gaines County, Texas
Pay zone: Devonian at 12,500 ft.
Discovery well: Rowan Drilling and Southland Royalty 1 Stanton-Brunson.
TD 12,796 ft.
IP 1,868 bbl. per day, 34° gravity.

Continental 2 Bell Lake, Lea County, New Mexico
Pay zone: Pennsylvanian at 12,600 ft.
Discovery well: Continental 2 Bell Lake Unit.
TD 13,044 ft.
IP 13,100,000 cu. ft. gas per day.

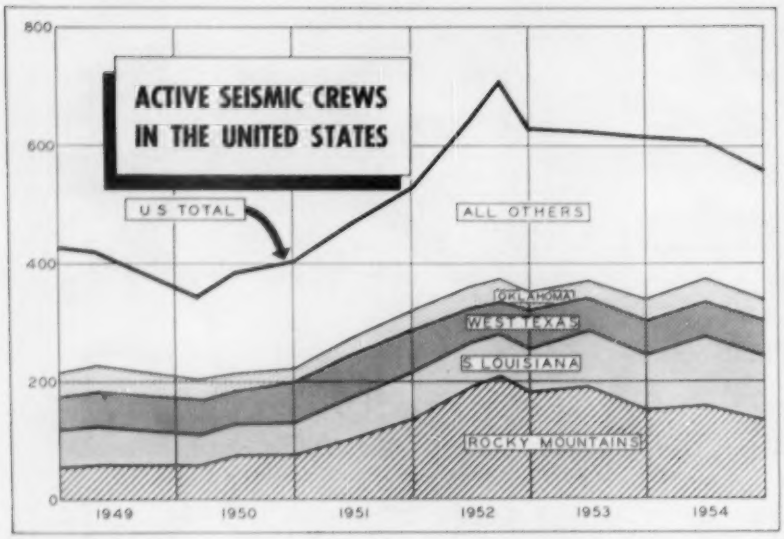
East Lake Palourde, Assumption Parish, Louisiana
Pay zones: Miocene sands at 12,538 to 13,400 ft.
Discovery well: Union Oil Co. of California 1 Williams.
TD 14,991 ft.
IP 250 bbl. per day, 39.2° gravity.
Confirmations: Six oil wells plus three gas wells.

Amelia, Assumption Parish, Louisiana
Pay zones: Miocene sands at 14,200 ft. and 14,230 ft.
Discovery well: M. L. Mayfield Co. 1 Lutcher-Moore Lumber Co.
TD 14,500 ft.
IP 110 bbl. distillate plus 2,000,000 cu. ft. gas per day.

Sinclair Oil & Gas Co. 1 Griffin, Marshall County, Oklahoma
Pay zone: 10 different pays indicated. Well was completed in the basal McLish (Simpson) at 6,600 ft.
TD 7,636 ft.
IP 810 bbl. per day.

Stanolind Oil & Gas Co. 1 Pitchlynn, Garvin County, Oklahoma
Pay zone: Bromide (Simpson) sand at 5,900 ft.
IP 1,066 bbl. per day.

Shell Oil Co. 1 State "A," Harding County, South Dakota
Pay zone: Red River (Ordovician) at 8,690 ft. First production in South Dakota.



have leveled off after dropping sharply from the 1952 peak. Seismic crews in 30 months during 1950-52 increased in number from 395 to more than 700, an abnormal rate of expansion for any phase of the oil industry.

Value . . . Exploratory drilling in 1954 has once again demonstrated the effectiveness of the seismograph, particularly in South Louisiana and West Texas.

In 1954 South Louisiana wildcatters had 158 discoveries and 198 dry holes for a success record of 44 per cent. The success record in West Texas was 25 per cent. Many of these successful wildcats were staked on the basis of earlier shooting. The national average in exploratory drilling is a success ratio of 17.5 per cent.

Past experience has shown a direct relationship between geophysical exploration and new oil reserves.

"Despite the complaint of decreasing returns in reserves from seismic activity, there is no other method known which can be satisfactorily used to replace it," comments the president of one exploration company. "The economy move, therefore, on the part of oil companies in regard to seismic activity means definitely that fewer reserves will be discovered.

"If increasing the oil reserves in the United States is important, it will be necessary in the future to expand greatly the seismic activities. This may be very difficult, since at the present time many trained men are leaving the industry because of lack of work."

Allen Bronston, National Exploration Laboratories, Fort Worth, indicates that the high percentage of discoveries made by major companies is attributed by many to better trained seismologists. "However true or false this may be," he says, "it is the reason the independent operators give for taking farmouts in preference to exploring and drilling their own blocks."

An oft-forgotten value of seismic work is in properly evaluating poor prospects and thereby saving lease rentals.

Although seismic work has proved its success in many areas, it is only one phase of an effective predrilling exploration program.

"Too many prospects are shot for the sake of shooting or keeping a crew busy," commented a West Texas geophysicist. "No area should be shot until all geological aspects have been studied and crew personnel briefed."

An official of a Houston exploration company noted that gravity and magnetic surveys frequently lead to increased seismic exploration rather than a substitute for it. "The proper approach," he said, "may be a composite survey of all geophysical methods."

What lies ahead? . . . The decline in seismic exploration may be reversed this year. But the upturn probably will be gradual.

Average estimate of geophysicists covered by the survey indicates that seismic activity this year will be 5 to 6 per cent greater than in 1954. Predictions for 1955 ranged all the way from an increase of 50 per cent to a drop of 20 per cent. The 50 per cent increase was made by a Fort Worth man and was based on contracts already received for work this year.

In all, 39 per cent of the estimates forecast a better year than 1954 and 43 per cent predicted activity equal to last year's, while 17 per cent indicated a drop in activity.

Some contractors expect a decline in domestic work this year but an increase in foreign exploration.

Much of the money previously earmarked for offshore work may be diverted to land shooting this year. Since offshore work is probably two to five times as expensive as land shooting, this would mean more crews could be hired for the same amount of money.

Some contractors feel that the impetus given exploration by the Korean war resulted in overexpansion of the geophysical industry and hurried recruiting of inexperienced personnel. Fewer but more experienced crews are now working. As result, quality of work should be higher this year.

Finding and keeping highly trained men continue to be major problems, however. Key personnel cannot be hired for a single job and dismissed when the job is finished.

"Geophysics no longer offers a preferred salary position above those positions which also carry a fixed place of residence," observed one South Texas geophysicist. "One might say, almost, that a man has to love geophysics to contend with its disadvantages."

Two in One Package

Consolidated Chemical Industries, Inc., saved space and money, and eliminated guy wires by building a stack through the middle of a water tank at its Baytown, Tex., plant. The 200-ft. stack will handle exit gases at the sulfuric-acid regeneration plant. J. C. Crowder, general plant superintendent, suggested the stack be built through the 125,000-gal. tank.

MINIAC II, electronic brain for oil exploration and production research work, poses between Atlantic Refining Co.'s L. J. Whorton, left, manager of research at Dallas, and Joseph Cotey, research engineer of Marchant Research, Inc.

Electronic Brain Types Answers

. . . or stores them in memory for future use

DALLAS.—Miniac II, a $90,000 electronic brain, soon will begin flashing answers to exploration and production problems so complicated and tedious that they probably would never have been tackled without the machine.

The compact 1,800-lb. unit, just placed in operation in Atlantic Refining Co.'s Dallas production-research lab, is the largest and fastest electronic digital computer in the Southwest.

What it will do . . . Atlantic will use the computer for two general purposes. It will speed routine mathematical calculations. Miniac can do in 1 minute the full day's work of an operator with a desk calculator.

It will also solve long research problems. Many equations in theoretical or experimental oil-research work can only be solved by trial-and-error methods—what the oil scientist calls "successive approximation" methods. Solving such a research problem can require months, years, or even a lifetime. This usually hasn't been practical. With Miniac, these sticklers can be conquered much faster.

Atlantic already has set up two tough problems for the brain to tackle. One of these will be to work out the most efficient rate or rates of production from thin oil columns.

The other is an attempt by Atlantic to improve formation-fracturing techniques. Miniac will be fed a great quantity of data on various volumes and types of fracturing fluid, proportions of sand, fracturing pressures, and down-hole temperatures. It will be expected to select a combination of variables which will do a better fracturing job. Miniac should tell Atlantic researchers, for instance, exactly how much increasing fracturing pressure a certain amount will affect length of fractures.

Later Miniac will be used to solve general reservoir equations and to study the propagation of seismic waves, design of natural-gasoline plants, and the effects of production rate on oil recovery.

How it works . . . Miniac II was designed and built in 6 months by Marchant Research, Inc., of Oakland, Calif. The only other computer like it, Miniac I, has been operating for more than 1 year in Atlantic's refining-research laboratories in Philadelphia.

The Dallas machine has more than 700 vacuum tubes and 1,500 germanium diodes acting as switches. In effect, it uses only two digits—zero and one. Any number in the decimal system, 0 to 9, can be represented in this "binary" system by a combination of the two digits.

Decimal numbers in a problem are fed into the machine by an electric typewriter. The machine converts the decimal numbers to binary numbers, solves the problem, and types out the answer.

Miniac receives and stores instructions and numbers on an aluminum drum coated with a magnetic material. It can retain more than 4,000 separate items and locate any one of them in less than one one-hundredth of a second.

Acting on instructions, it solves the problem and either types out the result or stores it on the memory drum for future use. It adds 10-digit numbers at a rate of 95 a second and multiplies them at a rate of 43 a second.

It also can be instructed to examine the results of its computation, make comparisons with other results, and select one of several alternate paths of additional computation.

A single alphabetical code, with 46 different instructions, is used to operate the versatile machine.

Ammonia Plant Contracted

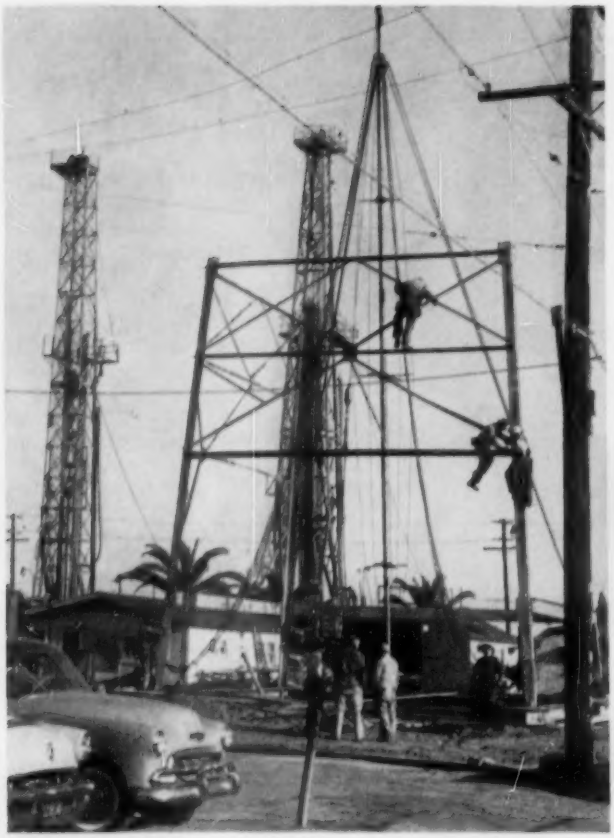
HAMMOND, Ind.—Contract for design, engineering, and construction of Calumet Nitrogen Products Co.'s proposed ammonia plant near here has been awarded to Fluor Corp., Ltd.

Calumet was formed by Standard Oil Co. (Ind.) and Sinclair Oil Corp. The new plant will utilize byproduct hydrogen from catalytic reformers at Standard of Indiana's Whiting refinery and Sinclair Refining Co.'s East Chicago refinery. It will synthesize 300 tons of anhydrous ammonia per day and also will produce nitrogen solutions and ammonium nitrate *(The Oil and Gas Journal, September 27, page 49)*.

Societies Select Site

NEW YORK.—A committee representing America's five largest engineering societies has recommended Pittsburgh as the site of their new engineering center.

Headquarters is now maintained in New York by the American Institute of Electrical Engineers, American Society of Civil Engineers, American Society of Mechanical Engineers, and American Institute of Mining and Metallurgical Engineers. The committee recommended that these societies join with American Institute of Chemical Engineers in forming a new corporation to build the headquarters.



FOURTEEN WELLS will be drilled from this site, most of them slanted under portions of the town where drilling is prohibited.

TRUCK TANKS are used as surge tanks for oil-base muds during drilling-in operations in close quarters.

Huntington Beach Is Now Called

EIGHT RIGS in a small area and in the midst of a housing area characterize the Huntington Beach boom. Twenty wells have been completed in the hot area, 30 rigs are running, and locations have been staked for more.

CRAMPED QUARTERS for a drilling operation is this area between two houses. Pumping jack does its job unnoticed in the activity.

CONFUSION AT ITS WORST finds oil equipment and materials covering almost every available inch of ground area.

"Bedlam Beach"

D. H. Stormont

LOS ANGELES. — California is enjoying one of its biggest oil booms in years, but some of the participants wonder if the boom area has enough oil to go around.

The shallow sand being exploited at nearby Huntington Beach may not yield enough oil to justify the extremely close well spacing. Voluntary conservation methods are not likely to curb the drilling spree.

Although close well spacing is common in many California fields, it is often accompanied by a thick oil sand. At Huntington Beach the recently tapped Jones sand is only about 175 ft. thick. In many cases one or two wells are being drilled on a 25-ft. lot.

Houses have been moved or demolished to make room for drilling rigs. On one city block there will be at least 17 wells, or about 10 wells per acre.

Principal objective is the 3,900-ft. Jones sand. Last week 23 wells had been completed in the pool, which was discovered 6 weeks ago. About 28 rigs were drilling, and 35 new locations had been staked.

Daily output per well is about 300 bbl. for a total from the pool of about 7,000 bbl. per day.

In an effort to curb town-lot drilling, where 86 permits have already been approved by the city council, the producers' conservation committee announced its findings. The studies indicate the Jones sand contains roughly 180,000 bbl. per acre of oil in place. Engineers believe only 40,000 bbl. per acre can be produced by primary methods.

The town-lot portion of the pool may extend over as much as 50 acres. If this proves the case, it may yield 2,500,000 or 3,000,000 bbl. of oil. Cost of the Jones-sand wells averages about $50,000 each. Wells drilled by late-comers may not pay out.

Activity is expected to remain high for some time, and no crude-price cuts are expected. Possibly no underground waste may be caused from overdrilling and rapid rates of withdrawal.

In recent years, operators always have worked out some sort of order when an unusually prolific or highly competitive field was discovered. The Huntington Beach situation, however, appears to be more than the conservation committee of California oil producers can handle with only voluntary controls.

Placerita, a 1948-49 development, is

Signal Gets City Lease

HUNTINGTON BEACH, Calif. The City Council has awarded Signal Oil & Gas Co. a lease on 46 acres of land near the spreading Jones-sand boom on the southeast edge of the city.

Signal will pay 37.5 per cent royalty on any oil produced. The 3,900-ft. pool is expected to extend under the Pacific Ocean.

The State Lands Commission has authorized lease bids on two submerged tracts nearby. One of the tracts covers 320 acres and the other 640 acres.

the state's best postwar example of overdrilling and waste. The new pool at Huntington Beach may extend under the Pacific Ocean, but it is not expected to reach Placerita proportions.

Where it's worked . . . In recent years the conservation committee has received cooperation in nearly all new oil fields. The operators, most of whom are members of the body, did not have to abide by rates recommended by the group's field engineering committee. But most of them have chosen to do so.

Long Beach Airport field is the most recent example of a cooperative development. There, The Texas Co. is trying to match well for well the efforts of adjoining operators on small tracts.

Most of the 24 wells completed flowed at rates of 1,500 to 2,500 bbl. daily. The operators, of whom Texaco is the only major company, first voluntarily restricted output to 1,000 bbl. daily. More recently, they agreed to a 750-bbl. limit. At the conservation committee's urging, their output may be further reduced to 500 bbl. daily in the near future.

This development is trending toward a 1-acre well spacing. Some of the 9,000-ft. wells, however, have more than 1,400 ft. of pay section, including about 800 ft. of net oil sand. Despite the close spacing, one operator pointed out that these wells have as much oil sand as a 40-acre well completed in only 20 ft. of sand.

Other examples of voluntary restriction are:

. . . The old Midway-Sunset field in Kern County has a restriction of 300 or 400 bbl. per day on similar wells.

. . . At Tejon-Grapevine, Reserve Oil & Gas Co., which controls almost the entire development, is cutting back high-flowing wells to 185 bbl. daily.

. . . Sespe Ranch field and the new Seal Beach discovery also are subject to voluntary controls.

Ferndale Goes Canadian

LOS ANGELES.—General Petroleum Corp. will feed its new Ferndale, Wash., refinery nothing but Canadian crudes in March.

Since the plant came on stream late in 1954 it has been using 15,000 bbl. daily of Alberta crudes. The other 16,000 bbl. has been crude from Ventura, Calif., and eastern Venezuela. The 35,000-bbl. refinery will reach capacity operation April 1.

The Canadian crude is brought to the plant by Trans Mountain Pipe Line Co.'s Edmonton line. Trans Mountain also shipped 45,000 bbl. daily during January to refineries in the Vancouver, B. C., area.

Cost Survey Starts

Three associations seek data to defend industry

TULSA.—The oil industry soon may find out how much it costs to produce a barrel of crude.

The answer is being sought, along with other data, in a joint survey by the American Petroleum Institute, Independent Petroleum Association of America, and Mid-Continent Oil and Gas Association.

Results of the survey will be used, if necessary, to defend depletion allowance.

Presidents of the three associations have asked members to provide the data needed. Questionnaires have been sent to about 2,500 oil producers in various parts of the country.

Average cost of a barrel of oil to the producer always has been an unknown factor. Although individual companies know about what their costs are, the national average has remained a mystery.

The survey also will find the cost per foot of drilling in different regions, cost of equipping wells, administrative costs, and other factors.

Two questionnaires are used in the survey. One covers costs of drilling and equipping wells completed in 1953. Data will be broken down by state and, in Texas, by district. The other questionnaire covers exploration, development, production, and other costs.

Individual replies are confidential.

The survey will cover both large and small producers representing all major oil states.

Previous studies of this type, such as one made during World War II, showed that about 60 cents of each dollar of crude-oil income was reinvested to find and develop new oil reserves.

Refining Interests Bought

HOUSTON.—Falcon Petroleum Corp. and Farmington Funding Corp. have bought controlling interest in two Texas refineries and plan to import Venezuelan crude for processing on the Gulf Coast.

The transaction involved an 8,000-bbl. refinery at Corpus Christi and a 2,000-bbl. refinery near Palestine, both owned by Corpus Christi Refining Co. Falcon, which has oil production in Venezuela, and Farmington, a New York investment firm, each acquired 30 per cent interest in the refineries.

Cecil V. Hagen, Falcon vice president, said his company will provide part of the feed stock from Venezuela. The amount of oil to be imported was not announced.

In another transaction, Gulf Coast Leaseholds, Inc., bought Corpus Christi Refining Co.'s production properties, which included five oil wells and one shut-in gas well.

Production Session

A.P.I. district meeting at Amarillo, March 23-25

AMARILLO.—Twelve engineering papers and a panel discussion on "Hydraulic Fracturing in Secondary Recovery Operations" will feature the Mid-Continent district meeting of the division of production, American Petroleum Institute, here March 23-25.

Four papers will be presented at meetings of the committees on drilling practice and production practice in addition to the papers presented at regular group sessions.

Papers and their authors include:

MARCH 23

Drilling Practice Committee

"Surface-String Cementing Practice," Francis M. Anderson, Halliburton Oil Well Cementing Co., Duncan, Okla.; "Use of Stabilizers in Controlling Hole Deviation," Henry Woods, Hughes Tool Co., Houston, and Arthur Lubinski, Stanolind Oil & Gas Co., Tulsa; and "Casing String Design Factors," Wayne Moody, Sunray Oil Corp., Tulsa.

Production Practice Committee

"Water Flood Project Performance Following Fracturing in Eastern Kansas," James R. Paul, Dowell, Incorporated, Wichita, Kans., and panel discussion.

MARCH 24

"Evaluation of Well Completions," C. L. Wilson, Sinclair Oil & Gas Co., Bartlesville, Okla.; R. V. Smith, Phillips Petroleum Co., Bartlesville; G. E. Hendrickson, Cities Service Oil Co., Bartlesville; and J. D. Stafford, Atlantic Refining Co., Tulsa. "Selecting Wells Which Will Respond to Production Stimulation Treatments," R. E. Gladfelter, G. W. Tracy, and L. E. Wilsey, Stanolind Oil & Gas Co., Tulsa. "The Southwest Antioch Gibson Sand Unit—A Progress Report on Gas Injection and Water Flood Operations," Shofner Smith, Phillips Petroleum Co., Bartlesville.

MARCH 25

"Conversion of Crude Oils to Low-Fluid-Loss Fracturing Fluids," J. J. Reynolds, Philip Bocquet, and H. F. Coffer, Continental Oil Co., Ponca City, Okla. "Use of Non-Fluorescing Oil and Nyrtan in Oil-Emulsion Drilling Muds," H. M. Barrett, Phillips Petroleum Co., Bartlesville. "Development and Application of a Water-in-Oil Emulsion Drilling Mud," M. D. Nelson, Dallas, G. A. Trimbel, Oklahoma City, and B. C. Crittenden, Midland, Tex., all of Magnolia Petroleum Co. "Role of Ductility in Tubing and Casing," F. A. Prange and G. G. Gebard, Phillips Petroleum Co., Bartlesville.

"Corrosion in Production Operations," W. C. Koger, Cities Service Oil Co., Bartlesville; "Results of Modernization of Obsolete Pumping Equipment in Southern Oklahoma," Frank Poorman, Shell Oil Co., Centralia, Ill.; "Application of Sucker Rod Types of Pumping Units," Cooper Richards, Lufkin Foundry & Machine Co., Lufkin, Texas; and "Economics of Mechnical Refrigeration of a Gas Stream for Greater Condensate Recovery," Dr. J. M. Campbell, University of Oklahoma, Norman, Okla.

Refinery To Expand

Mid-Continent to build new coker, add to cat cracker

TULSA. — Mid-Continent Petroleum Corp., on the verge of a merger with Sunray Oil Corp., will spend $2,800,000 this year tuning up its 65,000-bbl. West Tulsa refinery.

The biggest single item in building plans is a 7,000-bbl. delayed coking unit. It will be built by M. W. Kellogg Co. and construction will start next month. In addition to the coker, Mid-Continent will expand its 22,000-bbl. fluid cat cracker another 3,500 bbl. daily.

The new $2,500,000 coker will absorb the entire refinery's output of residual fuel and will produce 250 to 275 tons per day. Designed by Kellogg and Mid-Continent engineers, the coker will convert residual to gas oil and coke. The gas oil will be charged to the cat cracker and the coke marketed for use in metallurgical work and as electrodes.

The new unit will include special coke handling equipment to grade coke particles and hydraulic equipment to remove coke from two coke drums. Water at 2,000 psi. will power a revolving jet decoker to cut coke from the drums. Falling from the bottom of the drums, the coke will pass through the grading system and into freight cars for shipment.

Cracking capacity . . . Mid-Continent personnel will do the work involved in boosting the refinery's cat cracking capacity. Equipment has been ordered to boost the 22,000-bbl. daily capacity of the fluid cat cracker to 25,500 bbl. daily.

The cat cracker expansion is expected to be finished in September, 2 months before the coking unit is completed.

Contract Letting Near

YORKTOWN, Va.—American Oil Co. will soon award contract for the new 35,000-bbl. per day refinery it will build near Yorktown, Va. Actual construction of the complete, high-octane plant is expected to begin this spring. Startup is scheduled for the fall of 1956.

Clearing and grading of the 1,200-acre site is almost completed. Dredging and pier construction is under way. Piers will serve one new type supertanker of 700-ft. length, one T-2 tanker of about 550 ft., and two barges of 150 to 250 ft. Dredging to 40 ft. below sea level is necessary at the tanker piers, and 20 ft. is required in the barge area.

Texas Study Offers a Challenge

AUSTIN.—Less than a fifth of all the oil discovered in the history of Texas has been produced.

This is the conclusion of a significant report, "The Oil Resources of Texas," just finished by the Texas Petroleum Research Committee and soon to be issued here.

The report sets total discoveries to January 1, 1952, at 94.4 billion barrels. This includes all oil in place, much of which cannot be recovered by presently known means.

In an interview with The Oil and Gas Journal here February 9, Gen. Ernest O. Thompson of the Texas Railroad Commission and a member of the T.P.R.C. steering committee said:

. . . Of the 94.4 billion barrels discovered, only 14.8 billion barrels had been produced as of January 1, 1952.

. . . Oil remaining in known reservoirs totaled 79.6 billion barrels. Of this, 15.7 billion will be produced by conventional primary methods. Another 10.5 billion will probably be produced by secondary-recovery methods.

. . . "This leaves 53.4 billion barrels of oil known to be in Texas oil fields already discovered that lie awaiting the magic touch of the researchers."

Thompson said this is a challenge offered industry by T.P.R.C. The thought-to-be hidden oil exceeds the cumulative oil production of the entire United States by 7.9 billion barrels.

The research committee is composed of the Texas Railroad Commission, the Texas A. & M. College, and the University of Texas. The report was prepared by Dr. G. H. Fancher, of T.P.R.C.; Prof. R. L. Whiting, Texas A. & M.; and J. H. Cretsinger, former T.P.R.C. staff member.

The February 21 issue of The Oil and Gas Journal will contain a special section devoted to "Texas Oil Formations" by the Journal's Dr. Frank J. Gardner, exploration editor. The edition also will carry a multicolor insert chart, "County Correlator for Texas Oil." The special section also will contain detailed tabulation on primary and secondary Texas oil reserves from the T.P.R.C. report, "The Oil Resources of Texas."

Sinclair Plans Expansions

NEW YORK CITY.—Sinclair Refining Co. will start soon on a $30,000,000 expansion program at its Houston and Marcus Hook, Pa., refineries.

More than $16,000,000 will be spent at Houston to add a 24,000-bbl. reforming unit which will use RD-150 platinum catalyst. The catalyst is a recent development of Sinclair Research Laboratories, Inc., and Baker & Co., Inc.

At Marcus Hook, the company will replace its present crude distillation units with two 60,000-bbl. stills. The project will be completed in mid-1956.

The reforming unit will include a feed stock fractionator and a catalytic treating unit to remove sulfur from the feed stock.

M. W. Kellogg Co. has the engineering contract for the reformer, and Ralph M. Parsons Co. will build the crude units at Marcus Hook.

Ammonia Plant Planned

ST. PAUL.—The $15,000,000 ammonia plant to be built near here by St. Paul Ammonia Products Co. will utilize hydrogen from Great Northern Oil Co.'s refinery now nearing completion. It also will use natural gas provided by Northern Natural Gas Co., Omaha.

Plans for construction of the plant were revealed by Robert Campbell, spokesman for the Canadian group which organized the ammonia firm. Campbell is president of Industrial Chemicals Co. and Midwestern Industrial Gas Co., Calgary.

The plant will be about 15 miles south of the Minneapolis-St. Paul area. It will have a daily capacity of 200 tons of nitrates, anhydrous ammonia, and nitrogen solutions. Production is scheduled to start in April 1956.

Grea. Northern's refinery, scheduled to go on stream next summer, will process Saskatchewan crude. The new ammonia plant will adjoin the $25,000,000 refinery.

New Processes Available

PITTSBURGH.—Two new processes for conversion of petroleum feed stocks to hydrogen and olefins are available. The processes, developed by Hercules Powder Co., are licensed by Chemical Plants Division, Blaw-Knox Co.

Both processes use alloy tubes set vertically in furnaces operating at high temperatures.

In applying one of the processes to hydrogen production, natural gas or

propane mixed with steam is passed through a catalyst in the tubes and reformed to a mixture of carbon monoxide and hydrogen. This mixture is processed through a shift converter to produce carbon dioxide and hydrogen. Hydrogen can be produced from liquid petroleum fractions with recent improvements made in this method.

The olefin process converts gaseous or liquid petroleum materials to a mixture of ethylene, propylene, and other products. A full scale pilot plan has demonstrated the usefulness and flexibility of the process. For example, in the conversion of East Texas crude, high yields of ethylene can be obtained in a single pass.

Industry Briefs

AUSTIN.—Average bottom-hole pressure in East Texas field dropped 4.46 psi. during December. The January 1 pressure of 1,031.85 psi., however, is still above the 1,020.71 psi. recorded October 1, 1942. Oil production in January was 241,183 bbl. daily, up 18,272 bbl. daily from December.

FORT WORTH.—Charles B. Grace & Co., has sold a 42 per cent working interest in 10 Jack County leases to Erby Adams, Oklahoma City, and Ivan Culbertson, Tucson, Ariz., for about $500,000. The acreage, with 21 producing wells, is about 6½ miles southeast of Jacksboro.

TYLER, Tex.—Major Drilling Co., Tyler, last week paid approximately $1,000,000 for 15 producing wells in the Marion County portion of Woodlawn field in East Texas. Seller was R. W. Fair of Tyler. The deal also included 640 royalty acres, according to J. Frank Graham, president of Major Drilling Co.

TULSA. — The National Gasoline Association of America has completed a revised edition of its "Physical Constants for the Paraffin Hydrocarbons and Other Components Associated with Natural Gas." Arranged in a four-page folder, the table presents all values both "ideal" and "corrected," commonly used in natural gasoline plant computations.

CALGARY.—The Alberta Government will probably collect more than $80 million in oil revenue before the end of the fiscal year March 31. The first 9 months of the year brought in more than $62,500,000. The money comes from cash bonuses at sales of crown leases, reservations, and license land and from fees, rentals, and royalties.

SOUTHWEST

Foster Flood Asked

Stanolind wants to try water injection on 20-year-old Texas field; Stanotex Kelly-Snyder pilot flood approved

AUSTIN.—Stanolind Oil & Gas Co. is planning a pilot flood on one of its leases in 20-year-old Foster field of Ector County to see if water injection can give the big pool a new lease on life.

Foster, which produces from the Grayburg at about 4,100 ft., is nearing the end as far as primary oil recovery is concerned. The 34,000-acre pool has 657 wells. The total allowable for the field is 21,254 bbl. daily, or only about 30 bbl. per well.

More than half the wells, 374, are classed as limited capacity, 235 as marginal, 10 as having no allowable, and only 38 as capable of producing the top allowable.

Stanolind disclosed its plans for the test flood at a hearing before the Texas Railroad Commission last week.

R. G. Hiltz, Stanolind engineer, said the company plans to use six input wells to inject water on a double five-spot pattern on its E. F. Cowden "A" lease.

Water from the 1,200-ft. Santa Rosa formation would be injected by gravity flow through a closed system. Input rate would be about 130 bbl. daily per well.

Shell Oil Co. backed the Stanolind plan except for an objection to one proposed input well offsetting its Witcher "A" lease. Shell's E. L. Emmel said switching this producer to input service might lead to channeling of the water due to existing fractures.

Other flood actions . . . The commission also heard Sun Oil Co.'s request to start a flood project in the West sand of Midfields field, Matagorda County, and approved a Standard Oil Co. of Texas pilot flood in the Kelly-Snyder (Cisco sand) field of Scurry County.

Sun's water-injection program would affect all of Midfields' 2,450 acres. It would supplement an existing gas-injection project and recover an estimated 1,000,000 bbl. more oil.

There are 38 wells in the field producing under a combination of solution-gas, gas-cap expansion, and natural water drives.

Sun wants to inject about 3,500 bbl. of water daily below the oil-water contact at 9,128-50 ft. and 9,158-74 ft. through a single input well. Cycling of gas into the gas cap, at about 8,000,000 cu. ft. daily, would continue.

The Texas Standard project, a five-spot on 70 acres to start, is designed to see if a full-scale flood of the Cisco under the firm's 1,200-acre G. E. Parks lease is desirable. *(The Oil and Gas Journal, January 31, page 127.)*

There are 30 wells on the lease, which had produced about 1,500,000 bbl. as of December 1, 1954, of the 12,000,000 bbl. estimated in place originally.

Reynolds Hunts Gas

Aluminum firm signs deal with Three States Gas Co.

DALLAS.—Reynolds Metals Co., big aluminum firm, last week got into the gas-hunting business in a big way.

Reynolds Mining Co., a subsidiary, will spend several million dollars to explore and develop about 500,000 acres of prospective gas lands in Colorado, Utah, and New Mexico. The exploration will be the result of an agreement with Three States Natural Gas Co., Dallas, and others.

Reynolds Mining must drill 10 wildcats on eight Three States lease blocks before November 1 to live up to terms of the contract. It will acquire a one-half undivided interest in this acreage. The company also has an option to explore another 12 lease blocks in 1956 and 1957.

Three States owns about 350,000 acres of the leases involved in the deal. The remaining 150,000 acres is held by Western Natural Gas Co., San Jacinto Oil Co., Hancock Oil Co. of California, Albuquerque Associated Oil Co., J. H. Whitney & Co., and the estate of Paul B. English, of Farmington N. M., and Durango, Colo.

Roughly 100,000 acres in Colorado and 194,000 acres in Utah will be explored this year.

What's behind it . . . John A. McGuire, president of Three States, said only undeveloped properties are included in the deal. Three States will continue to produce and develop its gas properties in Clear Creek field of Utah and in the San Juan area of New Mexico.

Reynolds Mining maintains an oil and gas division in Houston. The com-

pany has some production in the Permian basin and along the Texas Gulf Coast, but the Three States deal is the biggest thing it has undertaken in petroleum operations. President of the firm is Walter L. Rice. James White is director of the oil and gas division at Houston.

Court Changes Mind

High Texas court to hear 6-year-old antitrust suit

AUSTIN.—The Texas Supreme Court has reversed itself and agreed to review the 6-year-old antitrust case against 10 oil companies marketing gasoline in Texas.

The state suit charges that the companies broke the law by raising tank-wagon prices of gasoline uniformly in 1946 when federal price controls were lifted.

It was filed in 1949 and has been knocking around from court to court ever since.

The case was dismissed in District Court for lack of evidence. The state appealed this decision successfully, and the case was ordered back to District Court for trial. The Texas Supreme Court first refused to review the decision.

What's involved . . . If the case is tried on its merits and the oil companies should lose, they may have to pay up to $8,000,000 in fines. The state is urging that each be fined $1,500 a day for a period of about 18 months in 1946-47.

Companies involved are Arkansas Fuel Oil Corp., Phillips Petroleum Co., Standard Oil Co. of Texas, Magnolia Petroleum Co., Humble Oil & Refining Co., Gulf Oil Corp., Continental Oil Co., The Texas Co., Sinclair Refining Co., and Cities Service Oil Co.

They contend the uniform price increases were a result of the long period of artificially low prices during the second world war and that the price hikes were long overdue.

They argued that a jury trial would be extremely long and costly and urged that the Supreme Court review the case to clear up legal questions which would be sure to arise during a trial.

Gasoline Plant Testing

HOBBS, N. M.—Otha H. Grimes last week started test runs of his newest natural-gasoline plant 6 miles southeast of Lovington in Lea County.

The plant will process at capacity about 8,000,000 cu. ft. of gas daily from the Paddock, Glorieta, and Wolfcamp pays in Lovington field and other pools in the area.

It is an absorption-type plant, employing the amine-solution method of desulfurization.

Rank Ellenburger Wildcat Hits

MIAMI, Tex.—The Ellenburger fever has hit the Texas Panhandle portion of the Anadarko basin. First Ellenburger production for the region is reported at a Phillips Petroleum Co. wildcat 10 miles southwest of here.

The Ellenburger hit is the first exploratory surprise of the year in the Texas Panhandle. Nearest Ellenburger production is 240 miles to the southwest in Andrews County, Texas. Closest Arbuckle (the Oklahoma and Kansas Ellenburger equivalent) is at Yellowstone pool in Woods County, Oklahoma, 136 miles northeast. The new strike is 176 miles southwest of Central Kansas uplift Arbuckle production and 192 miles south of Kansas' westernmost Arbuckle oil in Scott County.

The deep Anadarko basin wildcat, the 1 Troy, is in north-central Gray County. It is 1¾ miles southeast of Phillips 1 Delp, deep granite wash producer.

The 1 Troy topped the Ellenburger at 10,969 ft. The zone showed porosity from top to bottom of the hole at 11,370 ft. On drill-stem test from 11,200-11,370 ft. the wildcat flowed gas to the surface in 50 minutes at the estimated rate of 12,000 M.c.f. per day. Oil reached the surface in 85 minutes. It flowed at an estimated rate of 60 bbl. per hour. Gravity of the oil is 45°. Pipe is being set for production tests.

The discovery is located in the deep portion of the Texas Anadarko basin. Operators made great progress in exploring this huge, remote area last year. The 1 Delp was one of the more important hits of the year in the area.

Predicted deep drilling in the basin in 1955 has paid off with its first success, opening a new horizon for prospecting.

Gas Bills Hit Hopper

Texas legislator tries tax angles from all directions

AUSTIN.—If introducing a batch of bills assures passage of one, Curtis Ford, Jr., Texas legislator, is certain to succeed.

Shortly after the fifty-fourth session of the legislature began, Ford again introduced the so-called gas-reserves dedication tax bill which has bounced around in Texas legislative committees for several years.

This bill would slap a 1 cent per M.c.f. tax on gas-sale contracts for longer than a year. It would bring in an estimated $35,000,000 a year. The tax would be collected from the "beneficial" owner—in other words, the pipeline (*The Oil and Gas Journal, February 7, page 75*).

Now Ford has tossed three more bills dealing with gas into the hopper.

The first would place a flat 1.5 cent per M.c.f. tax on natural-gas production. It would replace the present percentage tax on natural gas and double gas-tax revenue to a new total of about $70,000,000.

The second bill, which would be tacked onto the present gas-waste law, would make it mandatory for the producer to pass on all gas-production taxes to the gas buyer. This would hold true until the gas price plus the tax equaled 10 cents per M.c.f. Presumably, the producer would pay all taxes after this point.

In case the second bill should prove unconstitutional, Ford submitted a third. This one would set a statewide minimum wellhead price of 12 cents per M.c.f. for gas having a heating value of 1,000 B.t.u. per cubic foot. The minimum price for gas of a lesser heating value would be proportionally smaller.

Importer Fights Back

Esso Standard official tells House committee that coal should be shooting at natural gas, jump in diesel power

WASHINGTON.—The fight over oil imports reached the explosive stage last week. Domestic oil and coal producers ganged up on the importers, and the importers hit back.

Coal witnesses asking for a quota on residual imports didn't tell the story right, M. W. Boyer, executive vice president of Esso Standard Oil Co., said in a brief sent to the House ways and means committee.

The charge that coal is faced with unfair competition from a "flood" of "waste" product produced with cheap foreign labor and sold in the U. S. at dumping prices isn't true, Boyer said.

Heavy fuel oil isn't a waste product. It is "tailor-made" to specifications of consumers, he said.

The price, far from always being under coal, fluctuates and now is more than coal.

Thousands of consumers would suffer from a cut in imports. They include many dependent on it for space heating, contrary to statements by the coal people.

Imports not the answer . . . Heavy fuel oil is highly important in time of emergency, and not useless as charged. It is essential to military and naval activities. Our merchant marine is dependent on it and is not convertible to coal.

Cuts of oil imports will not solve the ills of the coal industry or even help it materially. Figures of both the industry and the Federal Power Commission show that not more than 10,000,000 to 12,000,000 tons of coal a year would be needed if all consumers of fuel oil who could convert went over to coal.

Boyer told the committee natural gas and electric power should be the targets of the coal industry. After World War II the demand for residual rose slowly, but it has leveled off in recent years. But the consumption of coal has fluctuated widely and has declined over the past few years. The demand for natural gas and other energy has grown rapidly.

Diesels on spot . . . The biggest thing in the changing coal picture, Boyer said, is the railroad switch to diesels. The railroads support the coal industry's demand for a quota on residual, but they themselves have accounted for 83 per cent of the drop in demand for coal since 1946.

Residual also has felt the impact of dieselization. Since 1949 the railroads have bought over 14,000 diesel units but only 121 steam locomotives and 20 electric units. A lot of steam locomotives burned heavy fuel oil. The changeover to diesel power has reduced railroad demand for oil as well as coal.

"All these advances—oil-fueled marine transportation, diesel locomotives, oil and gas for space heating and for power and other large industrial plants—could be stopped or reversed only at the expense of the total economy," the Esso official declared. "While increasing use of oil fuels and natural gas has undoubtedly reduced the potential market for coal, it is light distillate and, especially, natural gas that have had the greatest effect on coal consumption."

We're Near Reserve Cushion

WASHINGTON.—The oil industry is rapidly nearing the 2,000,000-bbl. daily reserve production capacity wanted by the military.

Director Hugh A. Stewart of the Oil and Gas Division said last week excess capacity fluctuates with the demand for crude, but is now about 1,700,000 bbl. daily.

The military wants a 2,000,000-bbl. cushion in case of war. That is twice what we had at the outbreak of World War II.

Stewart said the OGD is now working on estimates of how long this could meet all the needs of the country if we were cut off from foreign supplies in another war. The industry could meet those needs "for a time," he said. Just how long is the big question.

Along with the production cushion, the country now has about 1,000,000 bbl. daily of excess refining capacity.

New Shelf Sale Planned

WASHINGTON.—Nominations for oil and gas leases on the outer Continental Shelf will be accepted by the federal Government up to March 25.

No date has been fixed for the opening of bids, but the sale probably will be held late in May or early in June.

The next sale will cover leases off the coasts of both Texas and Louisiana. The whole job of receiving nominations, deciding on the tracts to be sold, and receiving and opening bids will be handled at the Interior Department's new office at New Orleans.

Nominations will have to show the block numbers and names of areas as shown on the official leasing maps. They must be filed in duplicate. One copy will go to the manager of the Bureau of Land Management, 608 Masonic Temple Building, New Orleans, 12. The other copy must go to the oil and gas supervisor of the Geological Survey, 1503 Masonic Temple Building. All nominations must be in envelopes marked "Nominations for Leasing in the Outer Continental Shelf."

The bureau has held two sales, netting $139,735,000 in bonuses. It received $116,378,000 from leases off Louisiana and $23,357,000 from sales off Texas. The Louisiana take was cut from $129,527,000 when nine bids of Kerr-McGee Oil Industries, Inc. were cancelled because of an error in identifying tracts.

Research Defined

Interior work to aid, not compete with oil industry's

BARTLESVILLE, Okla. — The Interior Department will aid, but not supplant or usurp, research that should be carried on by the oil industry, Secretary Douglas McKay said last week.

McKay told the Bartlesville Chamber of Commerce that federal research should be carried on in cooperation with industry, but should never be on a competitive basis.

He said the department has laid out three fields in which the Bartlesville petroleum experiment station and other agencies of the Bureau of Mines will work:

. . . **Essential** fundamental projects that industry is not prepared to undertake but the results of which are needed in its commercial pursuits.

. . . **Research** that will help industry meet its problems because of scarce or marginal materials.

. . . **Research** of importance to the nation and to national security.

It should be based on a careful study of national needs, the secretary said. "Although here and there some short-term investigations may be required, federal research should by and large be directed toward long-term objectives. It should attempt to anticipate the future."

McKay said the department's scien-

tific work in the Southwest is being hampered by the shortage of technical people. There are not enough trained scientists and engineers to meet the needs of industry and Government. Too few are being educated now to fill the gap, and greater effort should be made to encourage students in those fields, he said.

Gas Bill in Congress

Texan's proposal is first to void FPC control of gas

WASHINGTON. — The first bill to cancel the Supreme Court ruling in the Phillips case has been introduced in Congress.

The bill, written by Rep. Walter Rogers of Texas, would exempt independent producers of natural gas from Federal Power Commission control. A large number of similar bills is expected to be offered by congressmen from the producing states.

The oil and gas industry will support any bill freeing producers from regulation. But it will put its effort behind a bill which Rep. J. Percy Priest of Tennessee, chairman of the House interstate commerce committee, is expected to sponsor. Priest plans to write his bill when the report of the cabinet energy resources committee is made public.

Industry bill . . . The industry-backed bill is expected to call for the exemption of all gas production, pipeline-owned as well as independent (see Watching Washington).

The big question is whether Congress will pass a bill voiding FPC control over the price of gas produced by pipeline companies. But industry men who are working on the bill think that is a matter for Congress to decide. The bill they propose would put all production on an equal footing.

The timetable for the legislation is still uncertain. It is hoped the cabinet committee report will be made public soon. But there has been no indication that agreement has been reached on its recommendations.

Once his bill is ready, Priest plans to hold prompt hearings. His committee hasn't yet written a schedule for the bills it will consider and it will be able to make a quick start on the gas measure if it is introduced this month.

Quick action on the House side is necessary if the bill is to become law this year. The Senate interstate commerce committee won't take the matter up until a bill is sent over from the House. If the bill takes too long getting there it may run into a log jam that would be hard to deal with.

Ike Opposes Oil Import Quota

WASHINGTON. — President Eisenhower turned his back on quotas for oil imports last week.

He told a news conference he does not like the idea of a quota to protect the coal industry. This, indirectly, would also hold true for domestic oil producers.

Residual fuel has been the particular target of the coal industry and the President's remarks were made in response to questions about a proposal to limit residual imports to 10 per cent of the domestic production.

The President explained he is trying to liberalize international trade on a reciprocal basis. One of the aims has been to drop quotas in trade with other nations. In the past 2 years great progress has been made in that direction. He would deplore any return to a quota system, he said.

Eisenhower pointed out the matter has not yet reached him in the form of a recommendation. He referred to the long-delayed report of the cabinet energy resources committee. There apparently have been sharp differences in the committee over restriction of imports.

The committee report hasn't been held up, the President said, it just isn't ready. He pointed to the complicated nature of the report and said each of the involved factors in the report is a problem in itself. He referred to the problem caused by the Phillips decision.

In effect, the President answered industry charges that the report is being held back.

At the Capitol last week the House interstate commerce committee indicated it has no plans to take up the Natural Gas Act until the middle of March (see Watching Washington).

Residual imports got some attention from the committee, however. Hugh A. Stewart, director of the Oil and Gas Division, said restrictions would result in a residual shortage or higher prices.

He said domestic refiners could produce all the residual needed, but it is an inferior product and crude can be used to better advantage in this country. Refiners, he said, would be unwilling to increase resid output unless an emergency occurs or the price goes up.

Since 1938, Stewart said, the yield of residual has been cut from 25 to 16 per cent. Most of the residual coming into the country is from Venezuela.

Ready to Test Its Sea Legs

Offshore Co.'s new mobile drilling platform, shown here at the Orange, Tex., docks of U. S. Steel's Consolidated Western Steel Division, is about ready to take its first shot at tidelands drilling. The barge has been leased to Humble Oil & Refining Co. to drill a test near Grand Isle, La. The platform is supported by 14 caissons 200 ft. long and 6 ft. in diameter. Near the bottom of each caisson is a tank or "doughnut" that keeps the caissons from sinking too deep in the mud. Each tank is 18 ft. high and 16 ft. wide. The unit is based on the patent applications of Col. L. B. DeLong. It weighs 6,100 tons. The barge was commissioned early this month (The Oil and Gas Journal, February 7, page 86).

WATCHING WASHINGTON

Bertram F. Linz

Railroads May Get Edge

President Eisenhower will ask Congress this week to adopt important new transportation policies.

If his recommendations are as rumored, the cost of moving oil by inland waterways and highways will go up and the railroads will be allowed to set their own rates.

The administration's idea is to lessen government interference with industry, encourage private enterprise, and reduce government costs.

Eisenhower is expected to call for the payment of tolls on the use of the inland waterways. If tolls are not asked for all waterways, they would be charged on those on which the Government spends money in the future.

He is expected also to call for some levy on highway movement, now subsidized by government contributions toward building costs.

The whole purpose is to strengthen the railroads' position. These suggestions would reduce the cost advantages which road and water transporters now have.

Giving the railroads the right to set their own rates would meet the complaint of the carriers that it takes too long to get rate changes through the Interstate Commerce Commission, which doesn't always give them what they ask. The railroads now have to justify their rates before they can become effective. Under the reported plan they would fix rates and it would be up to shippers to prove them unreasonable.

Delay Threatens Gas Bill

The snail's pace of the cabinet resources committee threatens the chances of legislation this year to free independent natural-gas producers from Federal Power Commission control.

Strategy of the gas industry group is to present its bill in Congress after the committee makes its recommendations. The committee is expected to favor exemption of independent producers. This would be a big boost for the measure.

But if the committee's report doesn't reach Congress in the near future, it will be difficult to hold lengthy hearings and get action on the bill by midsummer, before Congress adjourns.

It will require time to get the bill through. Long hearings are in prospect on both sides of the Capitol. Chairman J. Percy Priest of the House commerce committee plans to get into hearings quickly once he has a bill to work on. How fast the corresponding Senate committee will handle it is less certain.

A point on which the bill may stand or fall is that of exempting the production of the pipeline companies as well as the independent producers. If the companies are included, the consuming areas will fight the measure even more bitterly. If they are not included, the pipelines aren't likely to give much support.

More to the point, the exemption of pipeline companies would meet with opposition from congressmen who otherwise might vote for the bill. The 1950 bill, vetoed by Truman, started out with an over-all exemption but it was found necessary to drop the pipelines to get support. Even then the bill passed by only a few votes in each house.

Diesel Is Cheapest

Diesel oil is the cheapest fuel available to railroads. But fuel oil appears to be the most expensive.

The railroads figure their fuel costs not by price but by the number of ton miles a dollar's worth will give. On that basis, diesel oil gives nearly three times as much transportation as oil-burning locomotives and about 80 per cent more than coal or electric power.

The carriers send information on fuel consumption to the Interstate Commerce Commission along with operating statistics. The commission recently made some comparisons.

In the first 9 months of last year, diesel-electric locomotives produced 5,371 gross ton-miles per dollar of fuel expense. The same dollar bought only 1,849 ton-miles of transportation when fuel oil was used, 2,903 ton-miles with electric current and 2,952 ton-miles with coal.

Except for coal, the railroads' dollar didn't buy as much as in the same period in 1953. Last year the price of diesel fuel was 1.7 per cent higher than in 1953, fuel oil 6.8 per cent higher and electric current 18.8 per cent higher. The cost of coal was lower by 2.2 per cent.

Shale Plant Funds Asked

WASHINGTON.—Rocky Mountain congressmen are trying to reverse the decision of the Interior Department to stop shale-oil research at Rifle, Colo.

A House appropriations subcommittee is studying the department's money bill for fiscal 1956. No funds were provided for the Rifle plant in estimates sent to Congress, and the subcommittee has been asked to amend the bill to finance continued research.

Closing of the plant was proposed last year by a committee which studied Bureau of Mines functions. It was approved last month by the National Petroleum Council, which said the oil industry was ready to carry on shale studies. Later, Union Oil Co. of California revealed its plan for a $5,000,000 pilot plant near Rifle *(The Oil and Gas Journal, February 7, page 79)*.

A resolution calling for continuation of the work for at least another year has been introduced by five senators from Colorado, Utah, and Wyoming.

Sen. Gordon Allott of Colorado, speaking for the group, cited estimates that the Rocky Mountain shale deposits might produce as much as 464 billion barrels of oil. That is several times the known oil reserves in the Middle East.

The move to shut down the Rifle plant was attacked in Denver by Warwick Downing, chairman of the Colorado Oil and Gas Conservation Commission. Downing said it would be a "national calamity" if the Government halts its operation.

Fair Field Value Scored

WASHINGTON.—Rep. Sidney R. Yates of Illinois wants Congress to fix actual cost as the basis of rates for natural-gas pipelines.

Yates told the House the Federal Power Commission is not carrying out the purposes of the Natural Gas Act.

"In changing the method of valuation from actual legitimate cost, which it has always followed, to fair field value, it permitted unwarranted rate increases which are now being felt by the consumers in most metropolitan areas," the congressman said.

Yates said the results are shown in newspaper stores that gas users in Chicago and 17 Illinois counties will pay more for gas next month because of an increase of $5,216,000 allowed the Peoples Gas Light and Coke Co. The president of the company, he said, has stressed the fact that the increase is due to higher prices it must pay for natural gas.

The congressman said his bill would nullify the FPC policy in the Panhandle Eastern Pipeline Co. case last year.

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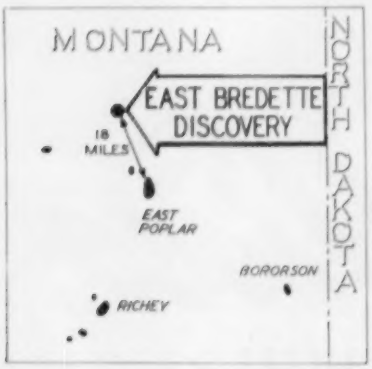

Montana Promising

Oil discovered in area not previously explored

BILLINGS, Mont. — The Montana portion of the Williston basin has its first 1955 oil discovery. It is The California Co.'s East Bredette wildcat in Roosevelt County.

The 1 Grimm, in an area of no previous drilling, recovered about 20 bbl. of oil per hour on test of the "C" zone of the Mississippian Charles formation at 6,538-53 ft. Test was through ¼-in. choke.

Contributors to the discovery well are Sinclair Oil & Gas Co., Murphy Corp., Continental Oil Co., and Placid Oil Co. Nearest well to the discovery is a dry hole, 4 miles southeast.

The Charles strike is 18 miles northwest of prolific East Poplar field where the Charles is the main pay. The 1 Grimm is the first successful well in eastern Montana since opening of Monoco Oil Co.'s Fertile Prairie field in Fallon County late last year.

Refinery Contract Awarded

RAPID CITY, S. D.—Great Plains Refinery & Development Co. will have its 5,000-bbl. refinery here on stream by the end of the year. Contract for the plant has been let to Succop Refinery Engineering Co., of Los Angeles.

The refinery will be the first of any size to be built in the prairie state *(The Oil and Gas Journal, November 15, page 165)*. Included in the $3,100,000 project will be a two-stage distillation unit, a 3,000-bbl. Thermofor cat cracker, and a catalytic polymerization unit.

The refinery will process Newcastle, Wyo., crude which will be brought in by truck. There is a possibility that the new plant may be connected with a 16-in. crude pipeline planned from the Williston basin by Shell Oil Co. and Murphy Corp. *(The Oil and Gas Journal, February 7, page 77.)*

Gasolines, burning oils, and jet fuels will be the main products. Arthur Gordon is president of the company. John Goodrich is secretary.

Leasing Acts Pushed

Bills would place Montana lands on 40-year schedule

HELENA, Mont.—Two bills before the Montana legislature are designed to solve the state's leasing dilemma and put oil and gas leasing of state-owned lands on a 40-year basis.

In 1953, the legislature passed an act putting leasing on an indefinite term basis. But the following year the state supreme court killed the 1953 measure, returning leasing to a 20-year basis. The United States Supreme Court has been asked to review the state court's ruling.

One of the proposals would repeal the 1953 act and the other would substitute the 40-year limit. The second measure provides for renegotiation of royalty payments at the end of 20 and 30 years. At the end of 40 years, the leases would be offered again.

Atty. Gen. Arnold H. Olsen has declared "there is little likelihood" of any leasing in the state this year unless legislative action is taken to clear leasing terms.

Other proposals . . . Additional bills relating to the oil and gas industry also have been introduced.

One would cut in half the $2 penalty for delayed drilling on state leases during the first 4 years. The penalty would be raised to $1.25 for the fifth and sixth years and to $1.50 thereafter. The measure also would raise the annual rental fee from 75 cents to $1 an acre and increase the filing fee from $2.50 to $5.

Two other proposed bills would hike the severance tax to 4 per cent from 2, and allow 10 per cent of drilling costs to be deducted annually over a 10-year period. Producers now can charge off all costs for drilling in 2 years.

Field Workers Pick C.I.O.

DENVER.—The National Labor Relations Board has announced that oilfield production workers of Far West Oil Co., Glenrock, Wyo., have voted 25-11 for representation by the C.I.O. Oil Workers International Union.

The N.L.R.B.-sponsored election was held on a petition by the union with consent of the oil firm. The workers are employed at the Big Muddy field near Glenrock.

Drilling Program Under Way

STERLING, Colo.—Cimarron-Western Drilling Co. of Tulsa and Denver has started a 50-well drilling program extending from northeastern Colorado to Kimball, Neb.

The project will cost an estimated $1,000,000.

Drilling of 15 slim holes is already under way in Logan, Washington, and Morgan counties of Colorado. Another 15 are scheduled from the area across the northern Colorado border into Nebraska.

A joint venture of Cimarron-Western and Ryon Oil Co. will drill another 20 holes from the Kimball area through Washington County, Colorado.

Pipeline Firm Dissolved

DENVER.—Rocky Mountain Pipeline Co. has been dissolved and its properties taken over by Continental Pipeline Co., wholly-owned subsidiary of Continental Oil Co.

Continental Pipeline acquired the properties after obtaining 55 per cent of outstanding Rocky Mountain Pipeline stock held by Continental Oil Co. to add to the 45 per cent it already owned.

Rocky Mountain Pipeline holdings included a crude pipeline from Lance Creek field in Niobrara County, Wyoming, to the Wyoming-Colorado state line.

Gasoline Plant Nearer

DENVER.—A gasoline plant for the Greater Clareton field of Weston County, Wyoming, is a step nearer realization.

A committee of major producers in the area agreed at a Denver meeting last week to accept a contract with Davis, Heineman & Wagner of Denver and Chicago to build a 50,000 M.c.f. per day plant. It would serve the Clareton field from Mush Creek to the Snyder Creek area of northwestern Niobrara County. The area involved covers about 70,000 acres. The operators must supply contracts guaranteeing 23,000 M.c.f. of gas daily, after which the construction firm will give

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the operators a firm commitment within 30 days.

Cost of the plant will be $3,000,000 to $4,000,000, according to James P. Sloss, Denver oil man and a leader in the conservation move.

Recoverable gas in the area is between 175 and 200 billion cubic feet, Sloss said.

Members of the committee, control about 80 per cent of the acreage in the fields. They agreed to ask the Wyoming Oil and Gas Conservation Commission to shut down all wells in the area producing more than 5,000 cu. ft. of gas to 1 bbl. of oil. Independent engineers would be engaged to make tests to determine which wells exceed the ratio.

The committee was organized to curb excessive flaring of gas, estimated at 80,000 M.c.f. daily, *(The Oil and Gas Journal, January 31, page 128).*

Price Fixing Asked

North Dakota bill would set gas price at wellhead

BISMARCK, N. D.—A bill is now before the North Dakota Senate which would authorize the Public Service Commission to fix natural-gas rates at the wellhead.

Dubbed the "Little Phillips" bill by its opponents, the measure was introduced by Sen. Carroll Day, a leader in a controlling senate coalition of the Nonpartisan League, Democrats, and Independents.

The bill has been called "the biggest single piece of legislation so far . . . to kill off oil and gas development."

Amerada Petroleum Corp., largest producer of oil and gas in the state would be most affected if the bill passes.

Also before the senate is a bill which would impose a 2 per cent gross oil production tax over and above a 4¼ per cent tax written into law by the 1953 legislature. Proceeds would go to the state's general fund.

The bill is the outgrowth of a North Dakota Farmers Union request for a higher oil tax.

Also introduced was a senate bill which would transfer from the state geologist to a petroleum engineer the duties of director of oil and gas conservation. He would be appointed by the Public Service Commission.

He would be headquartered in Bismarck rather than Grand Forks, in order to be closer to the industry.

Another senate bill would prohibit flaring of natural gas at any processing plant.

Tide Water Completes New Unit

A 10,600-bbl. Hydrobon-Platformer has been placed on stream at Tide Water Associated Oil Co.'s Avon refinery near San Francisco. A four-component blend of straightrun and thermally cracked naphthas, derived from a mixture of crudes, is being charged to the Hydrobon unit in the preparation of feed stock for the Platformer. The latter produces high octane Platformate. Byproduct hydrogen-sulfide gas will be used to make sulfuric acid at an adjoining plant owned by Tide Water and Monsanto Chemical Co. The combination unit was designed, engineered, and licensed by Universal Oil Products Co.

CANADA

Labor Talks Open

Agreement would cover all pipeline work in Canada

CALGARY.—Members of three major labor unions and the Pipeline Contractors Association of North America paved the way last week for a new wage contract affecting all pipeline construction in Canada.

Negotiations likely will resume in either Edmonton or Calgary during the first week of March. The meeting probably will follow the annual convention of contractors to be held at Victoria, B. C., February 18-20.

Agreement on a new wage contract is expected to be reached at the March meeting. The current agreement expires May 31.

Negotiations, and results, will cover all pipeline work in Canada. This will include the 1,200 men expected to be employed on the Trans-Canada pipeline.

According to Carl Berg, Edmonton, western representative of the International Laborers' Union, A. F. of L., the union men were "well satisfied" with initial talks.

Commenting on an earlier report that talks had broken off suddenly, Berg said: "That's nonsense. We didn't come here to reach agreement, but merely to find common ground for final discussions. We have accomplished exactly that."

Westcoast to Parallel Line

EDMONTON. — Westcoast Transmission Co., Ltd., is preparing plans for its second natural-gas transmission line before it has started its first.

The company announced last week that it would eventually parallel its planned 650-mile, 30-in. line from the Peace River area of northern Alberta and British Columbia to Vancouver, B. C. A short spur is planned on the first line to the international boundary near Sumas, Wash., where Pacific Northwest Pipe Line Corp. will buy 300 M.M.c.f. daily. The second will swing east to the Okanagan Valley area.

However, since the first line will have a capacity of 700 M.M.c.f. daily and the present contracted load is only near 350 M.M.c.f., the second line is expected to remain on paper for several years.

Ford, Bacon & Davis has the engineering contract for the first line, and Canadian Bechtel, Ltd., has the construction contract.

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But if you haven't yet rigged up with one of the B-series blocks, it's time you looked them over. You can't help noting their heavy side plates, caps, sheaves, and adapters. It's this heavier weight, plus center of gravity below the center pin, that makes the blocks so stable.

There are other features, too. For instance:

The blocks are designed around *big-diameter* center pins. Every sheave is equipped with a two-row tapered roller bearing, and each bearing is individually lubricated from its own fitting.

And here's something everybody likes—the ease of stringing up. With a Bethlehem block, you never have to remove the wire-line guards; a special device within the block makes the line self-guiding.

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		Rating*
B-30	.....	100 tons
B-36	.....	160 "
B-42	.....	250 "
B-55	.....	400 "

**All sizes designed on basis of 4-to-1 (or higher) safety factor as required by A.P.I. Standard No. 8-A for "Rating of Drilling and Production Hoisting Tools."*

In addition to drilling equipment and a full range of pumping units, Bethlehem offers Beth-Co-Weld line pipe, Purple Strand wire rope, and a complete variety of sucker rods, fasteners, etc. Ask for these products when equipping your oil-country installations.

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Big Australian Refinery

AUSTRALIA'S biggest refinery is turning out products 3 months ahead of schedule.

Australasian Petroleum Refinery, Ltd., placed a crude-distillation unit on stream at its Kwinana refinery near Fremantle in Western Australia early this month. Other units at the 70,000-bbl. plant will go into operation within 2 months. All will be completed before the May 1955 construction deadline.

The fast construction pace at the $80,000,000 plant has been achieved with a maximum labor force of 3,500, most of them Australians. About 35 Americans have been working at Kwinana and 187 technicians—including 78 high-grade welders and cable jointers—were brought from the United Kingdom. In addition, 484 immigrants from the United Kingdom were trained on the site for particular construction jobs.

The early completion of the distillation unit was tied in with the first shipment of crude for the refinery. A tanker bringing crude from Kuwait berthed at Kwinana in January.

Australasian Petroleum is one of the Australian associates of British Petroleum Co., Ltd.

Kwinana, with a frontage to Cockburn Sound, is a flat, scrub-covered area lying a few miles south of Fremantle, Western Australia's major port. Cockburn Sound provides 17,000 acres of safe anchorage up to 60 ft. deep. When dredging of two sandbanks at its entrance has been completed, the sound will be able to accommodate 32,000-ton tankers.

A few miles from the refinery is the South Fremantle power station, which will soon have a capacity of 100,000 kw. Twelve miles to the east is a series of dams, one of the state's major water storages. These facilities, together with the good load-bearing qualities of the ground, make the site an ideal one for a refinery.

Experts from England, helped by Western Australia authorities, chose the 900-acre site at Kwinana over a number inspected in other parts of Australia. The area is being joined by rail to Fremantle and Perth, and the existing good road connections will be supplemented by a new highway.

The builders . . . Prime contractors for the design of the refinery, and the supervision of its construction, are the M. W. Kellogg Co. of New York and its British subsidiary, Kellogg International Corp. Construction is being carried out by a consortium of British companies: Costain-John Brown, Ltd., Kinnear Moodie, Ltd., and D. C. & William Press, Ltd. All are experienced in the erection of refineries in various parts of the world and have operated alongside each other at a number of sites in the United Kingdom.

A total of 60,000 bbl. per day of products will come from the refinery. This production is expected to meet the requirements of B.P.'s distributing associates in Australia and New Zealand as well as the company's bunkering trade throughout Australia. Depending on requirements, principal products will be about 33,000 bbl. per day of fuel oil, 15,000 bbl. of gasoline (premium and regular grades), 8,000 bbl. of diesel and gas oil, and 2,500 bbl. each of aviation turbine fuel and tractor vaporizing oil. In addition, about 20,000 tons a year of bitumen will be produced. The plant is extremely flexible and is designed to meet seasonal and varying demands for light and heavy oils.

The project consists of three main elements: first, the refinery and its auxiliary services; second, the port capable of handling three 32,000-ton tankers at once; and third, a complete township to include homes for the company's employes and others, and all conveniences, shops, and normal municipal facilities.

Refinery units . . . The refinery plant comprises five main units. There are two identical crude-distillation units, each of 35,000-bbl.-per-day capacity. The crude oil will be pumped from the tank farm to each unit via its own pipeline system, through a series of heat exchangers into a single drum. From the single drum, to which a desalting unit can be added at a later date if required, the crude will pass through the furnace and into a crude tower operating under a pressure of 25 psi. Fractionation in the tower will split the crude into gasoline, naphtha, kerosine, light gas oil, heavy gas oil, and residue. The design of the units has been arranged so that the maximum amount of equipment, such as heat exchangers, pumps, and vessels, is at ground level. This reduces the quantity of structural steel normally used in refinery design and gives the unit maximum accessibility.

Residue from the distillation units is pumped directly through a special-alloy, vacuum-unit furnace into the vacuum tower. Here, distillation under high vacuum is carried out and a heavy gas-oil wax fraction obtained as overhead, leaving bitumen as resi-

due. The overhead feeds the catalytic cracking unit and is pumped directly forward either to the cracker or to storage.

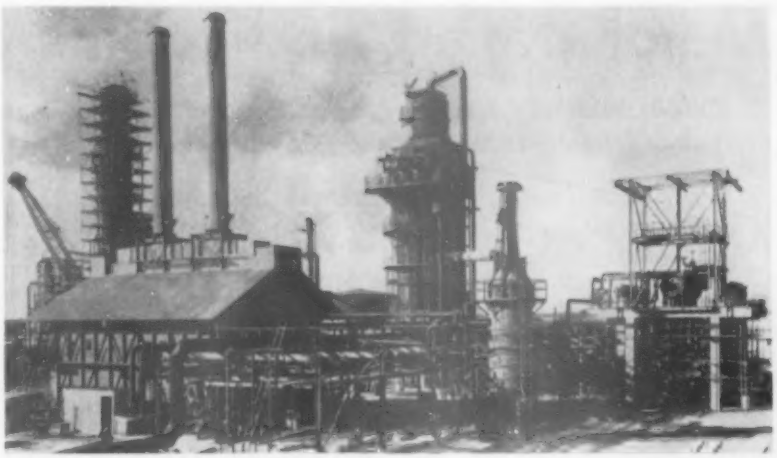
The heat obtained from cooling the bitumen residue is used to generate steam. A control house contains a board carrying the control instruments for the two distillation units as well as the vacuum unit. The vacuum unit processes 24,000 bbl. a day of residue, yielding about 12,000 bbl. of catalytic cracker feedstock and approximately the same quantity of bitumen.

The fluid catalytic cracking unit is designed to operate at 12,000 bbl. per day of feed directly from the vacuum unit on single-pass operation, or on 10,000 bbl. a day on 35 per cent recycle operation. Cracked products are first freed from catalyst by cyclone extraction and then fractionated to give gas, gasoline, gas oil, cycle oil, and decanted oil. The gasoline is stabilized and fractionated into light and heavy catalytically cracked gasoline. Both fractions are soda washed to remove sulfur compounds and phenols. Light, catalytically cracked gasoline passes to intermediate storage and then through a copper chloride sweetener to gasoline-component storage. Inhibitor is added en route to prevent gum formation. Heavy, catalytically cracked gasoline passes directly from the soda washer to gasoline-component storage, and inhibitor again is added.

Catalytically cracked gas oil is pumped partly into the diesel-oil-line blend and partly into flux storage. Cycle oil and decanted oil also passes into flux tankage. The gas formed is fed directly into the refinery fuel system.

Kwinana refinery is one of several B.P. refineries in which Platformers are being installed. The feed for the Australian plant is of a mixture of C_5-140° C. cut and naphtha from the distillation unit. This is first prefractionated in a distillation unit to give a 95° to 200° C. cut which is pumped forward to the furnace and then on to the reactors. Reactor product is passed to a stabilizer which splits it into gas, light platformate, heavy platformate, and bottoms. The light and heavy platformate go forward to motor-gasoline-component storage and the bottoms to flux tankage. The gas is treated in a small Girbotol unit in which H_2S is removed with diethanolamine. The gas is then recycled or used as compressor fuel. Any excess is pumped over to the Hydrofining unit.

Platformer capacity . . . The Platformer is designed to process approximately 5,700 bbl. per day of feed giving 4,800 bbl. of high-grade motor-gasoline component.



ONE OF THE FIRST units completed at Kwinana refinery was this vacuum distillation facility.

The function of the Hydrofining unit is to desulfurize middle-distillate feedstock which, at Kwinana, will be a mixture of kerosine and light and heavy straight-run gas oils. The process is a simple one: feedstock together with hydrogen is passed over a catalyst at a temperature of 780° F. and a pressure of 1,000 psi. The sulfur in the feed is removed as H_2S. A small amount of cracking takes place, but more than 95 per cent of the feed is recovered as gas oil of low sulfur content, suitable for Australian markets.

Five copper-chloride sweetening units make up the treating plant. The two units handling straight-run gasoline are of 7,000-bbl.-per-day capacity, the others being 4,000-bbl.-per-day design capacity.

Cooling water throughout the refinery is pumped from the sea at the rate of 2,500,000 gal. an hour. The process water is drawn from the Perth Water Board's storage at the rate of 3,000,000 gal. a day. Water storage includes two 1,000,000-gal. tanks.

Steam is used in the refinery in the process units, for pump and compressor drives, for product heating in the tank farm, and for refinery heating. In order to meet the maximum load, five 75,000 lbs./hour boilers—steaming at 200 psi.—have been provided.

Plant air is provided by three 750-cu.-ft.-per-hour compressors which deliver air at 100 psi. for all refinery requirements. The compressors are either steam or power driven to assure continuity of supply to instruments.

The tank farm comprises more than 80 major storage tanks. The good ground bearing permits use of tanks 54 ft. high, which under test had negligible settlement.

Up to 20,000 bbl. per day of various products will be pumped directly from the tank farm to existing bunkering and distribution depots in the Fremantle area by way of two 17-mile pipelines. The black oils will be pumped through a 12-in. line and the white oils will be sent in "parcels" down a 6-in. line.

In the refinery, the tank farm, and on the jetties some 200 miles of piping is being installed.

The jetty . . . The jetty is designed to accommodate three super-tankers at one time. L-shaped, its foot is a 1,000-ft. shore arm running out into Cockburn Sound and its longer side is an 1,800-ft. sea arm running more or less parallel with the coast. The sea arm is built in 20 ft. of water but, to provide the depth needed by large tankers, three short berths stand further out in water 40 ft. deep at low tide. These short berths, running parallel to the sea arm, are linked to it by concrete decking and banks of piping.

The following pipes are provided on the jetties: three 16-in. crude lines, three 16-in. fuel lines, a 16-in. ballast line, two 12-in. gas-oil and diesel lines, two 12-in. lines of aviation turbine fuel, two 12-in. gasoline lines, a 12-in. line for kerosine and another for tractor vaporizing oil, and two 8-in. bunker lines. A drinking-water line and a high-pressure main for cleaning purposes and fire-fighting are provided. Starting and stopping of oil loading is done by an electrical push-button system. A modern system of hose handling assures complete safety of operation.

To allow tankers to enter Cockburn Sound, a channel through two sandbanks had to be deepened. Since January 1954, two suction dredgers have been working 22 hours a day and have raised over 5,000,000 cu. yd. of sand. The channel is now 34 ft. deep, enough to allow medium-size tankers to reach the jetties. But to provide sufficient clearance for larger tankers, dredging will be continued until there is a depth of 38 ft.

Major Italian Find Looms

Gulf-Montecatini discovery flows 2,000 bbl. daily, may swing government over to the side of free enterprise

Dahl M. Duff

ANOTHER major European oil find may be shaping up on the Adriatic Coast of the Italian mainland.

Preliminary tests of the joint Gulf-Montecatini discovery near Pescara gave 2,000 bbl. daily of water-free, 34°-gravity crude from a depth of 2,550 ft. (776 m.).

Italy is becoming the hottest country in the current exploratory boom in Western Europe—and this latest private company success may swing the balance over to the side of free enterprise.

Although Italy produces large quantities of natural gas from fields in the Po Valley, total crude output in Italy of the state-owned E.N.I. (Ente Nazionale Idrocarburi) at the present time amounts to less than the production of this single well.

The new discovery is the 1 Cigno well located about 16 miles inland from Pescara almost directly east across the peninsula from Rome. It is the first oil of any importance that has been found on the Italian mainland outside the Po Valley. The operating company is Petrosud, S.A., owned 50-50 by the Italian industrial and chemical company, Montecatini, and Gulf Oil Corp.'s wholly owned subsidiary, American International Fuel & Petroleum Co.

The operators have already asked the Italian Minister of Industry and Commerce for a production concession. Fast action on the application would be another tipoff of a more favorable official attitude toward private-company operations. The Petrosud discovery was made on the Abruzzi exploratory block.

A statement by the backers of Petrosud called the discovery significant not only as to quantity but also as a "demonstration of the favorable results of private enterprise."

Second discovery . . . For Gulf, the Cigno discovery is the second in less than a year. American International Fuel & Petroleum brought in a good, heavy-oil field at Ragusa, Sicily, early in 1954. Sicily has petroleum legislation separate from that of the Italian Government itself, and though left-wing and nationalist elements sought to undermine the company in Sicily, a production concession was finally granted.

Some of the largest companies in the business are prepared to move into Italy if any sort of favorable legislation is passed. At the present, E.N.I. holds monopoly rights on the Po Valley, while elsewhere in the country, operations have to be conducted under terms of a law enacted during the Mussolini regime in 1927.

Standard Oil Co. (N. J.), which tried for years to open up the Po Valley to exploration, is showing new activity in Italy. The company is reported to have taken an interest in a large block in Sicily, and is closely watching developments in Italy itself. Other likely entrants are Caltex's American Overseas Petroleum, Ltd., and Conorado Petroleum Corp.

Policy may change . . . Although the faction favoring reserving all Italy to state companies is still strong, there are signs pointing to a more liberal policy. Communists and other extremists clamor against turning Italy's oil over to foreigners, but responsible Italians are beginning to realize the government lacks money, skill, and the risk-taking inclination that are fundamental to developing an important producing industry *(The Oil and Gas Journal, January 31, page 129).*

Amid the public fight over the issue of state vs. private-company operations, a parliamentary commission has begun a quiet study of the problem and is understood to be drawing up legislation to admit private companies to the Po Valley. Last year, the question was examined by a commission headed by Don Luigi Sturzo, founder of the strong Christian Democratic party. Sturzo favors liberalizing Italy's oil laws.

1,150-bbl. discovery gives . . .

. . . Egypt A New Oil Field

THE discovery well in Egypt's new oil field—Belayim—has been completed at a flowing rate of about 1,150 bbl. daily.

Belayim is a part of the operations of International Egyptian Oil Co. in the southern part of the Sinai Peninsula. The company is owned principally by a Swiss financial group and Cie. Financiere Belge des Petroles (Petrofina). Southern California Petroleum Corp., Los Angeles, holds a minority interest and handles the operations.

Producing depth in the Belayim well is about 7,350 ft., and the formation is upper Miocene. The well flowed at a rate of 48 bbl. per hour through ¾-in. choke. Southern California Petroleum reported that the Asl formation found by International Egyptian in 2 Feiran appears to lie about 1,000 ft. below the producing horizon in 1 Belayim.

Early in January before making the initial tests in 1 Belayim, the company cored oil sand to 7,324 ft. Two higher oil sands were sampled from 5,122-34 ft. and from 6,992-7,017 ft., but packer failures prevented full testing. The seismic picture of the Belayim structure indicates it may be the largest found in the Gulf of Suez region.

The discovery has been shut in until arrangements to move and sell the crude are made. The company is preparing to lay a pipeline from Belayim to about 8 miles north to the Feiran area. Locations have been made on a 40-acre spacing pattern for 2 and 3 Belayim.

Two failures . . . International Egyptian has had less success with its two other wildcats. The 1 Baba, drilled on a structure about 15 miles north of Feiran, has been abandoned at 11,250 ft. The well set a new depth record for Egypt. Another exploratory hole, 1-A Sidri, about 10 miles north of Feiran, has been temporarily abandoned due to drilling trouble and the need for the rig to drill the top hole in 4 Feiran.

Past activity . . . Belayim is the first new field discovery in Egypt since 1948. In that year, the Anglo-Egyptian Oilfields, Ltd., and Socony-Vacuum Oil Co., Inc., partnership discovered Asl and Ras Matarma farther north in the Sinai. Standard Oil Co. of Egypt, a Jersey Standard affiliate, brought in the first Feiran well the same year.

Five years of inactivity followed these discoveries. Anglo-Egyptian and Socony-Vacuum cut back their programs to drilling existing fields because of the unfavorable terms of the 1948 Egyptian oil law. Jersey Standard pulled out of the country and turned the Feiran acreage back to the government shortly after making the discovery.

A new oil law was enacted early in 1953, and exploratory work has been gradually increasing. International Egyptian acquired the former Jersey Standard area at Feiran, Conorado Pe-

troleum Corp. took a large concession in the Western Desert, and Anglo-Egyptian and Socony-Vacuum resumed work following an over-all agreement with the government last summer.

The acreage opportunities and prospects of Egypt have been looked over from time to time by different operators. Most recently trade reports say that Texas Egyptian Oil Co. has been formed for possible exploration by a United States group headed by L. Boyd Hatch, who retired as executive vice president of Atlas Corp. the end of last year.

Refinery Contracted

German company will build 30,000-bbl. Greek plant

THE Greek Government has given the design and construction contract for its new refinery to Hydrocarbon Mineraloel, G.m.b.H., Dusseldorf, the German affiliate of Hydrocarbon Research, Inc.

The refinery will have a crude capacity of 30,000 bbl. daily and will include catalytic reforming as well as crude topping. Plans call for operation on typical grades of Middle East crude.

The refinery will be the first in Greece. The government proposal provided that the contracting company would take 15 per cent down and finance the remaining 85 per cent of the cost.

The Greek Government invited proposals from contractors under a proclamation last July. Bidders were asked to submit proposals both for construction and subsequent operation of the plant. Offers were opened September 20 and evaluated with the assistance of George Armistead & Co., Washington, consulting engineers and technical advisors to the Greek Government.

The Greek Government has not yet announced its decision as to the operator of the completed refinery. Companies now marketing products in Greece have indicated an interest in operating the refinery and supplying the crude-oil needs.

The government said in Athens that the refinery would cost $11,757,000. It is to be completed by January 1957.

Venezuelan Record Falls

The highest production yet achieved in Venezuela was chalked up in the final month of 1954.

Under the stimulus of heavy winter demand for fuel oil, output of this world's largest oil-exporting country reached an average of 2,083,336 bbl. daily in December. This gave a 1954 average of 1,895,309 bbl. daily, also a record.

Venezuela's oil industry broke the two million-barrel mark for the first time in November when it hit 2,015,391 bbl. daily.

Creole Petroleum Corp. produced 962,521 bbl. daily in December, according to a report from the Mines and Hydrocarbons Ministry. Other companies and their December production included: Shell, 567,572 bbl. daily; Mene Grande, 310,560 bbl. daily; Socony-Vacuum, 76,692 bbl. daily; Texas, 44,252 bbl. daily; Mercedes, 25,710 bbl. daily; Atlantic, 21,448 bbl. daily; Richmond, 30,743 bbl. daily; Sinclair, 24,868 bbl. daily; Phillips, 7,788 bbl. daily; Pantepec, 8,973 bbl. daily; and Talon, 1,548 bbl. daily.

Beirut Refinery Opened

A 6,250-bbl. refinery has been opened 30 miles south of Beirut, Lebanon, at the eastern end of the Mediterranean.

The plant is owned by Mediterranean Refining Co. (Medreco), which is a joint company of California Texas Corp. and Socony-Vacuum Supply Co. It uses crude brought through the Tapline from Saudi Arabia.

Medreco plans to expand the capacity of the plant to 9,000 bbl. daily by 1956. The present plant cost $8,000,000.

For a time last year, completion of the plant was threatened by a price dispunte with the Lebanese Government. Construction was shut down until the company obtained an agreement with Lebanon on prices at which the products would be sold on the local market.

Argentine Field Spreads

Six wells have been completed by Yacimientos Petroliferos Fiscales in Argentina's new Madrejones field near the Bolivian border.

The latest well, M-3, reportedly produced about 1,800 bbl. of oil and 21,000,000 cu. ft. of gas per day. The well was drilled to about 13,350 ft., making it the deepest test in that area.

At last report, six other wells were being drilled nearby. They are expected to reach about the same depth.

Madrejones field is just north of the Campo Duran area, which has about 12 good oil producers.

Y.P.F. is planning a pipeline from there to Puerto San Lorenzo, in Santa Fe province, where the company operates a refinery. A gas line to Buenos Aires also is planned.

Petrochem Kickoff

Venezuela, Italian firm sign deal for first plant

VENEZUELA'S long-cherished plan for a petrochemical industry to use now-flared natural gas is moving toward reality.

The government has earmarked $6,500,000 for its initial expenditure and has signed an agreement with Italian Montecatini Chemical Co. for the construction of a nitrogen fertilizers plant.

The site has not yet been picked, but a location in the State of Anzoategui has been prominently mentioned by government officials. Over-all direction of the program will be in the hands of Dr. Eduardo Luongo Cabello, minister of mines and hydrocarbons.

The Montecatini company will build facilities to produce 30,000 tons of synthetic nitrates annually. The Italian firm recently signed an agreement to build a similar plant at Barrancabermeja in Colombia.

The Venezuelan Government's long-range plans look forward to facilities producing a number of such products as fungicides, insecticides, and soil conditioners as well as nitrogen products for agriculture and industry.

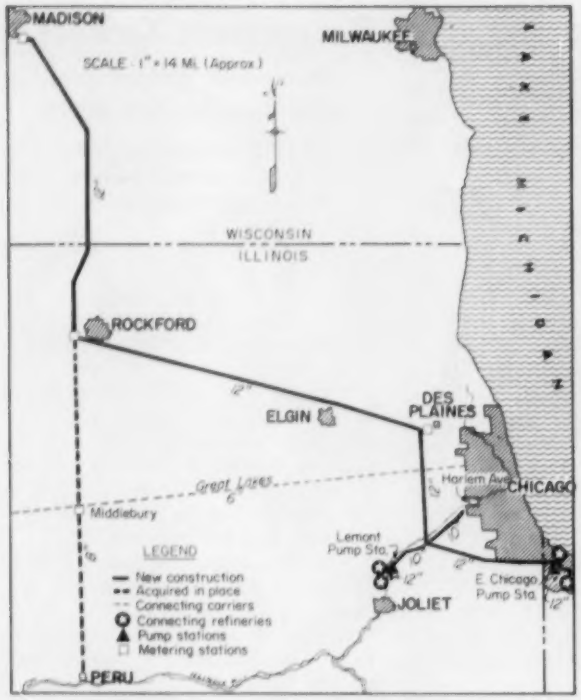
Venezuela has enormous quantities of natural gas produced with oil. However, the supply is only partially used in cycling, repressuring, and gasoline plants. The high costs of operations in Venezuela and the relatively small local market potential have discouraged private capital from the petrochemical field.

International Briefs

Rogers Geophysical Co., Houston, will do extensive exploration work in the Bordeaux basin in France for Soc. Nationale des Petroles d'Aquitaine, the French company. The crew will work out of Pau. Guy Ratliff will supervise the work.

What is claimed to be one of the largest and finest grease plants in Europe has been opened by Vacuum Oil Co., Ltd., at Birkenhead, England. The blending and compounding works can turn out 200 different grades. Annual output will be about 10,000 tons.

Standard Vacuum Refining Co. of South Africa, Pty., Ltd., has placed a phosphoric acid catalytic polymerization unit on stream at its Durban refinery.



FIRST BIG PRODUCTS LINE into Wisconsin, Badger offers low-cost transportation from refineries in the Chicago area.

YAHAVA RIVER CROSSING on the Rockford-Madison line. Heavy wall pipe used on all rivers eliminated need for river weights.

One of nation's most "citified" arteries, Badger's

267-Mile Pipeline Has 260 Crossings

Much of route is through heavily congested areas, over 75 miles of system being laid in highway, railroad, city street, or canal right-of-way

by R. G. Deering
Assistant Pipeline Editor

THE new Badger Pipe Line System will probably end up with the doubtful distinction of having more right-of-way through urban territory than any other system in the country. The products system starts in East Chicago, Ind., heads west through heavily-settled areas south of Chicago, turns north to Des Plaines—still through congested areas—and finally stretches out across the plains to Rockford, Ill., and Madison, Wis.

The line into Madison will be the first products line into that area. It is being built as a direct result of steadily increasing costs of truck and rail transport which had previously served that section. The entire system is being constructed as a joint venture by Cities Service Oil Co., The Texas Co., Pure Oil Co., and Sinclair Pipe Line Co. Cities Service Pipe Line Co. did the engineering work, is supervising construction, and will operate the completed system.

Badger will be comprised of a 182-mile, 12-in. line from East Chicago to Madison, an 18-mile, 10-in. line from Lockport, Ill., to Chicago, and a 67-mile, 8-in. line from Peru, Ill., to Rockford. This latter line was purchased by Badger from Sinclair and had previously been in products service.

Pump stations will be located in East Chicago, Peru, and Lemont, Ill., and products for the system will be taken from Cities Service and Sinclair refineries in East Chicago, from The Texas Co. refinery at Lockport, from the Pure refinery at Lemont, and possibly from others in the Chicago area. Deliveries will also be made into the 8-in. by Sinclair from a barge terminal on the Illinois River at Peru. A tie-in will be made with the Great Lakes Pipe Line Co. system at Middlebury Junction, southwest of Rochelle, Ill.

Deliveries will be made through meter stations located at Harlem Avenue in Chicago and at Des Plaines, Rockford, and Madison. This metered-delivery feature of the system points up one of its most important aspects, i.e., Badger is strictly a transportation facility, operating as a closed-pipeline system. No tankage will be provided at any of the delivery points nor will there be any intermediate storage. All volumes will be metered in and metered out with the shipper furnishing all storage.

Urban construction . . . Over 75 miles of the Badger system is laid in highway, railroad, city street, or canal right-of-way—most of it in areas which could be classed as heavily populated or in-

dustrialized. The route made for the usual difficulties in laying pipe through urban areas—traffic congestion, limited right-of-way, and numerous crossing jobs. As an example, 260 highway, railroad, or water crossings were necessary.

Also characteristic of construction through such areas is the fact that right-of-way for the entire line was very expensive and procurement of easements took considerable time, not only for the section around Chicago but also on the route from Des Plaines to Madison.

Pipeline construction contracts were awarded three companies. The line from East Chicago to Canal Junction and to the Harlem Avenue metering station was laid by Morrison Construction Co.; that part from Lockport to Des Plaines and to Rockford by Contracting & Material Co.; and the Rockford-Madison section by Mid-States Construction Co.

Morrison Construction Co. built the pump station at East Chicago and the meter stations at Harlem and Madison. The Lemont pump station and the Canal Junction control point were built by Midwestern Constructors, Inc. Office, warehouse, and meter facilities at Des Plaines were built by Sumner Sollitt Co. Meter stations at Middlebury and at Rockford were built by Poling & Bacon Construction Co. and Station Construction Co., respectively.

Pipe . . . Though the initial operating pressure will be only 450 psi., the line is constructed of high-strength line pipe in anticipation of a much higher operating pressure in the future as throughput demands increase.

From East Chicago to 6 miles beyond Des Plaines, the pipe is graded down from A.P.I. 5LX 42, ⅜-in. wall, to 5LX 52, ¼-in. wall. This allows for an ultimate operating pressure of 900 psi. at the East Chicago Station. Pipe from Des Plaines to Madison is ¼-in. by X46 and that from Lemont to Harlem Avenue station is ¼-in. by X42.

All underwater crossings were made with ⅜-in. wall pipe, which is heavy enough to eliminate need for extra weighting. Crossings of the Calumet River, were made on highway bridges and did not require the use of heavy-wall pipe.

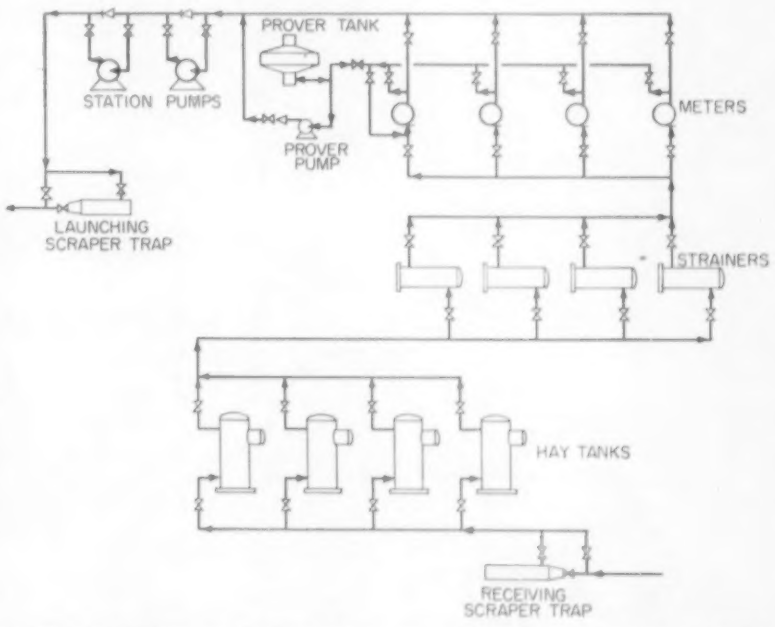
Somastic was originally specified for that part of the line around Chicago to give it extra mechanical protection in case of future excavation or construction in the line's vicinity. Favorable coating bids later made it possible to specify that type of coating for the entire line.

Stations . . . Pump stations will be equipped initially with two main pumping units with provisions for later addition of two more units. These will be single-stage centrifugal pumps driven by 2,300-volt, 3,600-r.p.m., 300-hp., explosionproof motors rated for Class I, Group D locations.

Station discharge and suction valves are motor operated with provisions for either remote or local control. The main auxiliary motors are started across the line and the associated switchgear is located in weatherproof enclosures outside of the station building.

Starting sequence for a station, which may be initiated remotely by the dispatcher or locally by the station operator, calls for opening of the suction valve, starting of suction booster pump, sensing for presence of adequate suction pressure at main units, starting of main units, and opening of discharge gate as unit comes up to speed. The normal amount of shutdown and lockout de-

WINTER SLOWED CONSTRUCTION on the northern section. Here a push section is being readied for a swamp in Wisconsin.



FLOW DIAGRAM for Badger pump stations. Hay tanks, strainers, and meters are sized to handle ultimate expected flow of line.

vices are provided to afford safety in operation and prevent damage to equipment.

Filtration equipment will consist of hay tanks and strainers; 200 mesh screens will be installed for the early stages of operation, but this value will be varied as line conditions permit. Scraper traps are also provided and scrapers will be scheduled as necessary. Oil-soluble inhibitors will be used from the beginning of operations, and their injection will be automatically proportioned according to throughput.

Pumping volumes will be determined on a meter-in, meter-out basis with each station being equipped with four 6-in. meters. These will handle the line's ultimate capacity of 80,000 bbl. daily.

Proving of the meters will be done by the volumetric-tank method. Individual meter readings are fed to a totalizer which keeps a running sum of the total throughput. The reading of this totalizer is transmitted by instrument selysens to a ticket printer in the station control room. Here, beginning and ending tickets will be printed for each separate tender handled. Each of the delivery-meter stations has from two to five meters with similar totalizers and printers.

Initial operation . . . When the system goes into operation, it will have the following capacities when pumping gasoline at a station discharge pressure of 450 psi:

From East Chicago to Madison 27,500 bbl per day,

From Lemont to Madison, 28,000 bbl. per day,

From East Chicago to Harlem Avenue 59,000 bbl. per day,

From Lemont to Harlem Avenue, 65,000 bbl. per day.

With the addition of two more units at the stations the line will pump at approximately 900 psi. at the following rates:

From East Chicago to Madison 40,000 bbl. per day,

From Lemont to Madison, 41,000 bbl. per day,

From Lemont to Harlem Avenue 80,500 bbl. per day,

From East Chicago to Harlem Avenue 76,500 bbl. per day.

Centralized control of the system will be maintained by the dispatcher located at the operation's headquarters in Des Plaines. Here, all pressure from the East Chicago and Lemont stations and from Canal Junction will be received and recorded. The dispatcher will have push-button remote control over mainline valves. He will be able to start and stop pump units, open and close suction valves in the pump-station receiving manifolds, and open and close valves in the crossover network at Canal Junction.

The crossover at Canal Junction adds considerable flexibility to the system in that East Chicago will be able to pump straight through to Rockford and Madison, while Lemont pumps to Harlem Avenue; or East Chicago can pump to Harlem Avenue while Lemont pumps toward Madison.

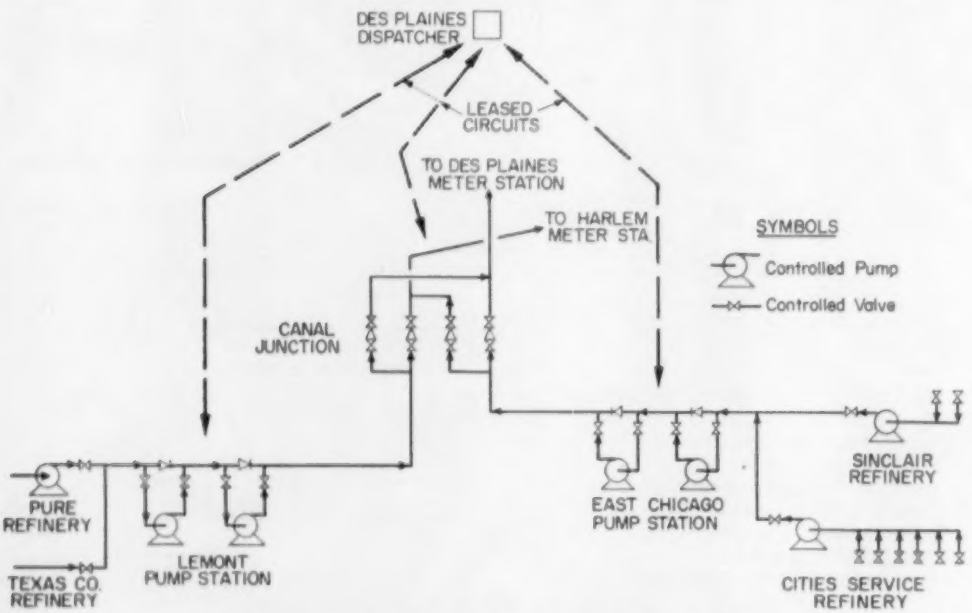
Remote control of the refinery booster pumps will also be vested in the station operators at Lemont and East Chicago. They will, of course, also have local control over valves and motors at their respective stations.

Communication . . . The system's basic communication needs will be provided by a closed-loop teletype network to which all pump and meter stations will be connected. The teletype circuits are provided by common carrier, as are the circuits necessary for telemetering and remote control.

Interface marking . . . To provide for a maximum accuracy in switching, the dispatcher will be aided by information from 10 capacitance-type interface detectors which will be located throughout the system. Each pump station and meter station will have one, two will be located on the 8 and 12-in. lines at Rockford, and two will be located at Canal Junction. Signals from the Canal Junction units will be telemetered to the dispatcher.

This device takes a small amount of product from the line, in the order of 2 to 3 g.p.m. It channels it through a chamber where the dielectric constant is continually measured, and with the aid of a small pump, injects the product back into the line. Signals from the devices at Canal Junction will be transmitted continuously to the Des Plaines office and recorded there for the dispatcher's use.

Changes in gravity of products passing the detector cause a corresponding change in the measured dielectric value. In this way, the dispatcher can tell quite accurately when an interface has passed a given point.



BADGER'S DISPATCHER will be located at Des Plaines and will have control over both pump stations and the cross-over junction.

SPECIAL PRECAUTIONS taken in drilling this medium high-pressure gas well included the three pressure-operated, ram-type preventers and one pressure-operated master gate shown above. This equipment cost $30,000—but it can save hundreds of thousands of dollars.

Here's why and how to

Take Extra Care in Completing Medium High-Pressure Wells

D. D. Jackson

THE basic danger in completion of gas wells is explosion or fire resulting from uncontrolled escape of high-pressure fluids from the formation. Therefore, the necessary precautions are fire prevention and leak prevention.

Author is with California Co., New Orleans. Paper presented at A.A.O.D.C. safety conference, New Iberia, La., November 4, 1954.

Fire prevention is not necessary unless there is a **leak** to provide fuel, so the primary precaution is prevention of leaks.

Problems in control of medium high-pressure gas wells, those with 5,000 to 7,500-psi. flowing pressure, may be illustrated by assuming certain drilling conditions and calculating the results of normal activities. Assume a 9⅞-in. bit drilling at 10,000 ft. approaching a gas sand. Gas in the sand is confined at a pressure of 6,500 psi. Our primary aim is to keep the gas in its original position until the hole is properly cased and tubed.

In order to keep the gas in place, assume 13 lb. mud as a drilling fluid. This mud develops 6,760 psi. at 10,000 ft. Assume that 5 ft. of sand is drilled at the rate of 20 ft. per hour. Now circulate out and see what happens. Twenty gallons of formation were ground up and distributed in approximately 100 bbl. of mud as the 5 ft. of sand was drilled. Certainly a portion of the formation fluid was also distributed into the mud stream. Ten per cent of the total volume, or 2 gal., is a reasonable assumption for the amount of formation fluid actually liberated into the mud stream.

Therefore, 100 bbl. of 13-lb. mud cut by .02 gal. per barrel of 6,500-psi. gas is pumped to the surface. When the **first** barrel of gas-cut mud reaches the surface, the gas has expanded to 8 gal., which means that the mud has been cut from 13 lb. to 11 lb. per gal. $13 \times 42 = 546/50 = 10.9$, 1,250 ft. of gas-cut mud is coming up. However, the total reduction of bottom-hole pressure is very small, and since we have a 260-psi. factor of safety, no harm is done.

If a drilling rate of 60 ft. per hour is assumed, the mud returns will be cut to 8.3 lb. per gal., but the total bottom-hole-pressure reduction is only about 30 psi., so the formation fluids are held in place.

Pulling out of hole . . . Therefore, one may drill the sand safely and circulate off the gas. However, what will happen when we pull out of the hole? What effect does hoisting have on bottom-hole pressure? Assume a hoisting rate of 180 ft. per minute, four stands pull wet, pipe filled up after pulling one row.

Pulling suction 12 psi./1,000 ft. of 4½-in. drill pipe 9 × 12	= 108 psi.
Pulling suction due to drill collars, tool joints and prot.	= 25 psi.
Head loss due to drill pipe displacement (5 bbl.)	= 35 psi.
Head loss due to wet pipe (4.5 bbl.)	= 35 psi.
	203 psi.

In this case, our 260-psi. safety factor was sufficient. So 13-lb. mud will keep the well under control. Now let us assume that 7-in. casing is set and 2⅞-in. drill pipe picked up for completion; 13-lb. mud was all right for drilling the well. So we use that for completion work. All will be fine unless a trip with open perforations becomes necessary. If this should occur, an interesting but sad series of events will result. When the first stand is

pulled, the bottom-hole pressure is reduced as follows:

Pulling suction 37 psi. per 1,000 ft. of drill pipe = 10 × 37	= 370 psi.
Pulling suction due to drill collars, tool joints and prot.	= 70 psi.
One stand wet (¾ bbl. lost)	= 15 psi.
	455 psi.

Now the safety factor is running short.

Let us visualize what will happen. The driller will pull the first stand slowly. The crew members will check for swabbing and install the pipe wiper. Everything will look fine; so after pulling a couple of stands slowly, he will speed up and come out of the hole. The well will not flow profusely at first. Some force is required to remove the wall cake from the sand face. As each stand is hoisted, a small amount of formation fluid will enter, and flow will stop when hoisting is stopped. If the man who fills up the hole is on his toes, he may detect the flow the first time the pipe is filled up. But the flow may go undetected until considerable mud is displaced by formation fluid.

When the twelfth stand is pulled, the reduction in hydrostatic head will be as follows:

Pulling suction 37 psi. per 1,000 ft. of drill pipe = 9 × 37	= 333 psi.
Pulling suction drill collars, tool joints and prot.	= 65 psi.
Displacement of 12 stands = 4 × 30 × .67	= 80 psi.
Assume five wet stands = 2 × 30 × .67	= 40 psi.
	518 psi.

Obviously, formation fluids enter the hole as the pipe is hoisted and eventually the well will flow.

If only 3 bbl. of formation fluid are pulled into the hole, approximately 500-psi. back pressure will be required to prevent fluid entry when the slug of gas is circulated off bottom. And 2,000 cu. ft. of gas will be liberated at the surface. The most obvious solution to this situation is to increase the mud weight. 6,500 psi. + 518 psi. = 7,018 psi. But to be well on the safe side, assume a hydrostatic head on bottom of 7,200 or 14-lb. per gal. mud.

Running in hole . . . Now, as the drill pipe is run in the hole, the pulling suction becomes running-in pressure. So 400 psi. of running-in pressure will be developed if 2⅞-in. pipe is run in a 6-in. hole at the rate of 30 seconds to a stand, and an additional quantity, probably 200 lb., must be added to account for piston action of bit as the pipe is run. Thus the hole is subjected to shock loads equivalent to the head developed by approximately 14 lb. per gal. of mud. If lost circulation results, we are forced to work with narrow factors of safety.

These observations suggest that:

1. Safety factors for mud in 9⅞-in. hole should be 50 psi. per 1,000 ft. of depth. Safety factor for 6-in. hole should be 75 psi. per 1,000 ft. of depth.

2. It follows that high-pressure sands are more easily controlled with large-diameter protective casing, and mud-weight safety factors should be increased as hole size is decreased.

3. Blowout preventers are needed to supplement the mud program.

A blowout preventer is a valve designed to control or prevent the escape of formation fluids when the mud program fails. A blowout-preventer hookup usually consists of one blowout preventer with blind rams, one with pipe rams, one with all-purpose rams or pack off, and a choke manifold to control the rate of flow at the surface. The assembly of this equipment varies considerably; but certain precautions should be observed regardless of the arrangement of the basic parts.

Recommended precautions are as follows:

1. The closing system should include an accumulator bottle of sufficient capacity to close all preventers with 1,150 psi. standing on bottle.

2. All blowout preventers should be operated with oil (either 10 W.T. motor oil or diesel).

3. Preventers and accessories should be tested to working pressure of preventers with clear water. This test should be repeated periodically.

4. Avoid adaptors, especially below master-valve positions.

5. Never use secondhand rings.

6. Use all-steel valves in master positions.

7. Install permanent handles on all valves.

8. Install a remote-control valve on at least one preventer.

9. Provide a supplementary closing system.

10. Control valves must not leak.

11. Provide a gage to register annular pressure.

The above equipment controls annular flow. Equipment to control back flow through the drill pipe must also be provided. When drilling high-pressure zones, a drill-pipe float installed in the bit sub is recommended for this purpose. In addition, a floor safety valve is also recommended. This valve should be light in weight so that it can readily be installed by hand.

Blowouts are not premeditated occurrences. When a well blows, the men are always surprised and often startled or confused. Therefore, if blowout equipment is to do the job for which it is intended, the closing operation must be simple and quick to perform, and the personnel must be well-trained in the operation.

Remove ignition source . . . Formation fluids which escape into the mud system must be released at the surface. In order to do this safely, fireproof equipment is necessary. In our previous example, 3 bbl. of 6,500-psi. gas expands to approximately 2,000 cu. ft. at 15 psi. When such a quantity of gas is released through the choke line, a fire hazard is created. Three things are necessary to start a fire: fuel, oxygen, and a source of ignition. When we have fuel and oxygen, we endeavor to remove all sources of ignition to prevent fire. Some suggestions for removing sources of ignition follow:

1. Use vaporproof lights on the derrick, in the engine house, and around the mud pits.

2. Use explosionproof or totally enclosed motors on the shale shaker, fans, and other auxiliaries.

3. Install water-cooled exhausts on all internal-combustion engines.

4. Large electric motors should have a fresh-air suction for the cooling system.

5. All switch boxes, rheostats, and resistor banks should be totally enclosed or cooled by blowers with fresh-air suctions.

6. Mud-gas separators and mud degassers are also recommended as auxiliary equipment on medium high-pressure wells.

Good casing strings . . . Another important consideration is the design and installation of the casing string. Since tubing leaks are a common occurrence in gas wells, we must consider the possibility of high casing pressures. It is impractical to design casing to withstand this high pressure with a reasonable factor of safety; therefore, it is wise to control the position of the bursting point.

In most systems of casing design, the lightweight pipe is in the upper 5,000 ft. of the string with heavier pipe at the top. That is 26-lb. pipe at the top with 23-lb. pipe immediately below. Thus, if the string should fail due to high pressure, the rupture should occur

"Blowouts are not premeditated occurrences. When a well blows, the men are always surprised . . . the closing operation must be simple and quick to perform, and the personnel must be well-trained in this operation."

"The number of washover jobs may be reduced or simplified by use of a special packer fluid to leave in the annulus. This mud is designed to reduce high-temperature jellation and the settling of barytes."

somewhere in the 23-lb. casing. The last place we want a casing leak is near the surface where a crater may result. Therefore, it is wise to use a multiple-stage cementing tool and cement the gas string back to the surface for reinforcement, thus leaving a weak spot below the multiple-stage cementer.

All pipe used in gas strings should be of N-80 quality or better, and the internal minimum-yield pressure of the landing joint should be 125 per cent of the estimated flowing pressure. When hoisting drill pipe before running casing, the drill pipe should be pulled slowly to prevent accumulation of trip gas in the mud. Trip gas is of particular concern when it accumulates near the center of the hole. For if conventional floating equipment is used, the gas-cut mud will be displaced to the surface as the casing is run and may start the well to flowing. Even if this does not occur, trouble may develop when circulation is established.

When trip gas cannot be eliminated from the mud stream, definite plans for control during the cementing operation should be made in advance. The casing should be equipped with differential fill-up equipment and run in the hole slowly as a precaution against lost circulation. A good supply of reserve mud and plenty of water should be on hand to help control the well if returns are lost. Test the casing by displacing the top (300 or 500 ft.) of mud with water and applying approximately 2,500 psi. If the casing is completely displaced with water, excessive pressure is required on the surface to establish a differential across the joints down the hole, and the casing is subjected to an unnecessary collapse test.

Series-1,500 blowout preventers should be used for the completion work. A string of drill pipe with plenty of protectors to protect the casing string is picked up for drilling out and squeezing. The mud weight should be raised if possible to offset the additional suction due to hoisting through small casing. When the well has been properly squeezed and perforated for production, the all-important job of running the tubing is performed.

The installation of a reliable tubing string is a most difficult job. A recommended procedure for successfully performing this job follows:

1. Have tubing inspected, and hydrostatically test all tubing at the well site to 80 per cent of minimum yield.

2. Clean all threads with solvent and inspect for damage.

3. Dope with uncontaminated A.P.I. high-pressure thread compound.

4. If coupled pipe is used, install coupling with 24-in. pipe wrench and replace field-end protectors.

5. Exert extreme caution when picking up and stabbing tubing to prevent contamination of dope and damage to threads.

6. Power tongs are recommended for the makeup. Fully 1,200-lb. torque is recommended for 2⅜-in. tubing.

7. Hydrostatically test the joint to 125 per cent of estimated flowing pressure with strain on joint.

Tubing run in this manner is leak-free when it is placed in the well. But many times a leak will develop before the well has produced a month. Most of these leaks are connection leaks and occur in the top 3,500 ft. of the string. Integral-joint tubing is, therefore, suggested for this section of the string. Pup joints, crossover subs, and landing nipples should also be avoided in the top 3,500 ft. of tubing.

Other precautions . . . Two landing nipples and a safety joint are recommended for the tubing string. It is suggested that one landing nipple be placed between the packer and the safety joint and that the other landing nipple be placed at approximately 3,500 ft. These landing nipples may be used to advantage in case of tubing leaks or a washover job.

Washing over tubing in high-pressure wells is a dangerous job. For example, 2½ in. tubing run in 7-in. casing is usually washed over with 5-in. wash pipe. An exceptionally large suction is developed as the wash pipe is hoisted from around the fish. If the top of the fish were at 4,000 or 5,000 ft. and flow through the tubing were started, killing the well would prove to be a very difficult job.

The number of washover jobs may be reduced or simplified by use of a special packer fluid to leave in the annulus. This mud is designed to reduce high-temperature jellation and the settling of barytes. One mud used for this purpose is a bentonite-barytes mixture with ½-lb. per bbl. driscose and sufficient chemical for proper dispersion.

If a workover is necessary, the safest procedure is to set a back-pressure valve in the bottom landing nipple before the well is killed. Although there is some danger of damaging the valve when the well is killed, the valve will not go down with mud in the tubing. The mud pumped in the tubing to kill the well should be about ½ lb. per gal. heavier than the weight necessary to do the job. After taking these precautions, if washing over is necessary, one may proceed with a degree of safety.

Check the tubing string for corrosion soon after the well is placed on production. If there is evidence of corrosion, take steps to prevent it. A regular program to determine the rate of corrosion is essential so that the tubing strings may be replaced in time to protect the casing from high pressures.

If the well is to be shut in for a long period of time, the following procedure is recommended to reduce pressure and corrosion on the tubing: Displace the fluid in the tubing with 5 bbl. bentonite and water mixture followed by fresh water treated with .15 lb. per bbl. potassium dichromate.

NELSON REFINERY CONSTRUCTION INDEX

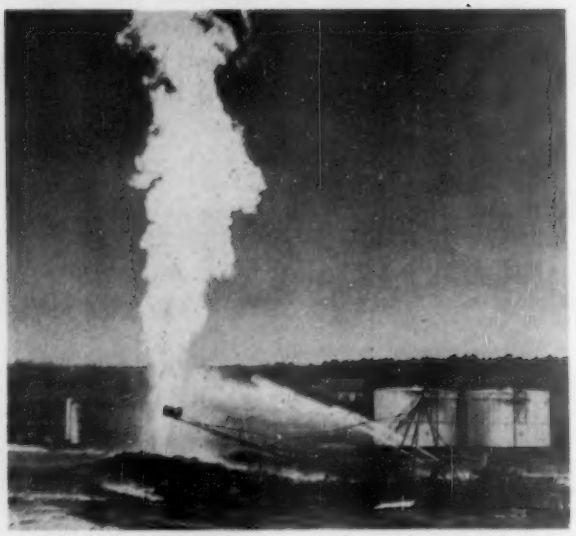
Compiled by W. L. Nelson, petroleum refinery consultant, Tulsa.

The Index was explained July 7, 1952 (page 105), as well as the Indexes of Individual Items of Equipment that appear on the quarterly Cost-imating page.

	Index (1946 = 100)						
	1948	1950	1951	1952	1953	Oct. 1954	Per cent over last mo.
Pumps, compressors, etc.	127.0	138.2	155.9	155.6	162.5	166.6	0
Electrical machinery	127.6	134.9	154.3	152.2	156.4	159.4	0
Internal-combustion engines	116.9	126.0	146.1	146.5	148.1	150.8	0.13
Instruments	120.0	127.8	142.3	146.2	151.8	153.9	0
Heat exchangers	130.0	140.0	152.0	165.8	174.9	166.4	0
Miscellaneous equipment average	*122.1	*126.2	*145.1	153.3	158.8	159.4	0
Materials component	139.3	149.5	164.0	164.3	172.4	176.0	0.11
Labor component	128.0	144.0	152.5	163.1	174.2	186.1	0.27
Nelson construction index	132.5	146.2	157.2	163.6	173.5	182.1	0.22

*Used in computing the Nelson Index until April 1952. These are slightly different than the average of the Miscellaneous Equipment Items shown above.

Blowout! Drillers lose control and the well blazes.



Positioning the charge over the well head and . . .

. . . And it all might have been avoided had the operator taken more

Precautions to Prevent Blowouts

by George W. McCray

Blowouts are dangerous, expensive accidents. They may kill or maim several men and cost hundreds of thousands of dollars. Yet their cause and prevention is well known. The hazard lies in an all-too-common failure to use the knowledge and the equipment that can stop them. This article briefly and simply describes that know-how and that equipment.

A LARGE percentage of blowouts are caused by failure to follow good, established practices. Not every blowout is deadly, but almost any blowout can cost more than it costs to furnish proper protection on all other wells. Therefore, the general practices described in this article should be used as a guide to protecting drilling rigs and personnel from this ever-present menace.

Blowouts occur when drilling-fluid pressure is less than the natural fluid or gas pressure in some geologic formation penetrated by the well, and when the surface fittings on the well are not in suitable condition for restraining the excess pressure involved.

The excess pressure to be contended with at the surface can be much more serious if an appreciable amount of gas has come up the hole and displaced drilling fluid. Thus, when an attempt is made to shut the well in, the upper part of the hole no longer has the weight of its column of drilling fluid to help restrain the formation pressure.

There are several ways in which the drilling-fluid pressure may become less than the formation pressure:

1. The well may penetrate a formation having unexpectedly high (abnormal) pressure.

2. The bottom-hole drilling-fluid pressure may be temporarily reduced a surprising amount simply by pulling up the drill string, especially when the mud pump is stopped.

3. The column of drilling fluid may be lowered by the removal of drill string without proper fill-up precautions.

4. The drilling fluid may become improperly lightened by rain or by careless addition of too much treating water (or oil).

It has been said, and is probably generally true, that a large percentage of blowouts are due to human failures to follow good, established practices. Where high pressures are encountered unexpectedly, it should be possible for reasonably alert personnel to notice any increasing flow of drilling fluid and to start controlling it before it gets too bad. This can usually be observed either by increased flow at the flow-line or by increased level in the pits.

If it is observed soon enough, it may be possible to start carefully increasing the weight of the drilling fluid and controlling the flow with little interruption

Author is division drilling superintendent, Stanolind Oil and Gas Co., Texas-Louisiana Gulf Coast division, Houston.

. . . blasting with explosive ends the fire. But . . .

. . . though ready to cap, the well's still dangerous.

to operations. If the increased flow has let too much gas or salt water lighten the rising column of fluid, and has even begun to blow mud and gas out of the well, it may still be possible to close blowout-preventer equipment, open a suitable-sized choke to permit only restricted flow, and then circulate in gradually weighted up mud to counterbalance the high pressure.

Where high formation pressures are just about evenly counterbalanced by the drilling fluid (such as when excess weight is being avoided for fear of lost circulation, it may easily happen that the upward movement of drill string, either to add another joint or to come out of the hole to change bits, may cause a sufficient temporary reduction of bottom-hole fluid pressure that some formation gas can momentarily flow into the well bore. It may not be much volume at the high bottom-hole pressure, but, as it works upward in the hole and expands, it eventually lightens the upper mud very seriously.

If the drill string is pulled steadily out of the hole without replacing the removed volume of the steel pipe with an equal volume of drilling fluid, the fluid level in the well will be seriously lowered and the bottom-hole fluid pressure will be correspondingly decreased. This may permit formation gas to enter the well bore.

Either of the foregoing contribute to the frequency of blowouts at times of trips—when coming out or while out of the hole, or just after getting back to bottom.

Bad weather conditions, excessive rain, and poor lighting at night may contribute to careless maintenance of proper control.

Blowout protection . . . Protection against blowouts, like any insurance, requires some thinking, and some expenditure of time, effort, and money.

Proper protection is not simply a matter of dollars, however. It is more a matter of frame of mind. This includes the frame of mind of the management, of the supervisors, and of the crews. If any of the people involved don't believe in and work at some part of the protection, that part may be neglected and this may wash out the value of all the rest of the protection.

Abnormal pressures . . . One of the primary considerations in protecting against blowouts is properly estimating the drilling conditions. In many places, ample experience makes such estimates quite accurate. A great recent contribution has been the chart of abnormally high pressure zones prepared by the A.P.I. southwestern district subcommittee on abnormal pressures.

Proper application of such information is important. It is often desirable to set intermediate protective casing before penetrating high-pressure zones that require high mud weights. This is because: (1) there may be excessive trouble with lost circulation in too long a section of open hole when mud weight has to be rapidly built up to a high value; and (2) a shallow string of surface casing may not provide enough pressure protection for bottling up a gas kick of the proportions that can develop in drilling high-pressure zones.

Where drilling and formation-pressure conditions are not well known, it becomes a matter of calculating the risk involved in the available courses of action. Specifically, is it worthwhile to try to go too far without a proper casing program and blow-out preventer selection, and so take a chance of losing the entire investment and incurring public liability and property damages? Or is it simply "good well digging" to provide proper protection on any well and extra protection on a wildcat? It can be argued that if you make the wildcats too expensive, you can't afford to drill enough of them. Yet if you let the wildcats get into trouble, you make them too expensive. Obviously, the balance between precaution and expense is a matter of good judgment and experience.

Equipment installation . . . The selection of blowout preventers depends not only on the pressures, but also on the flow possibilities expected. A highly productive gas formation may get out of control faster and be worse to contend with than oil or high-pressure salt water. It is therefore desirable to provide more protection when drilling any good gas zones, or any wildcat than when drilling normal-pressure oil wells. Added protection is provided by a preventer which can pack off around the kelly or around a tool joint if pipe happens to stick and a kelly or tool joint is opposite the preventers. An arrangement for moving pipe in or out of the hole under pressure is also desirable. If the kelly is not involved, this may be done with two sets of ram preventers.

A kelly-cock of at least the same pressure rating as the blowout preventers should always be used. It should be capable of easy manipulation because it may have to be operated by a man hoisted in a sling when the kelly is at the upper part of its travel.

A safety valve that can be easily stabbed in the drill pipe should always be kept available on the derrick floor. It should be put in place on the pipe when wireline cores are being pulled. Its upper connection should allow the kelly to be connected to it, and it should have strength enough to pick up the weight of drill pipe beneath it.

All ram preventers are equipped with manual stems by which they may be closed if fluid pressure is not available. Manual stems are effective against moderate well pressures, though they may not be effective if too-high well pressure has developed before they are operated. They also serve as an excellent locking device to hold preventers closed if control-fluid pressure is lost. They should be provided with suitable extensions and handwheels beyond the derrick floor at easily accessible positions.

Of course, all rigs should be equipped with first-aid fire extinguishers.

Choke manifold . . . This should be connected to a spool below the pipe preventers by flanged connections. It should have at least two flanged valves immediately next to the spool. These valves should be capable of closing off and sealing on, or actually shearing, shale fragments or pieces of rubber drill-pipe protectors.

A fairly good-size, straight-through connection should be provided to permit nearly full circulation with very little back pressure, and to get good mud into a lightly kicking well without taking too much time or causing a formation breakdown. The branches of the choke manifold should have two different-size chokes so trials for proper size can be made without delay when a kick has to be shut in.

The assembly should have a replaceable mud-pressure gage so no misunderstanding develops about the pressure being dealt with.

Testing . . . Even with the best of equipment installed, it is still essential for the men to operate it properly. Threaded and flanged connections may leak if not made up properly, so it is important to test them. Gaskets may deform further as additional loads are applied, such as those caused by vibration in drilling or setting additional blowout-preventer loads or casing loads. Therefore, casing heads and blowout preventers should be pressure tested in place to a realistic program. Merely going through some motions to put something in a report is in the same class as taking extra change from a blind man. It can be done without trouble, but it isn't good business.

"It is obviously time-consuming to check preventers a little oftener than absolutely necessary, but it is certainly better and cheaper than finding one inoperative when it is needed."

Relatively simple equipment is now available to put a full water-pressure test in place on each item of a blowout-preventer assembly on a drilling well. This should be done both before penetrating expected high-pressure zones and at reasonable periods thereafter if drilling continues for quite a while. It will often be found that flange bolts require retightening.

An unthinking frame of mind of an operating man may let him either install a lightweight nipple or fitting at a critical point or reinstall a damaged part. Full-pressure testing of the assembly is protection against these possible human failures.

Daily or tourly drill . . . Blowout preventers are exposed to mud-carrying cuttings, sand, and chemicals. The cuttings and sand sometimes settle out in a very tight-packed mass. Or the chemical may wash away lubricant and promote corrosion. For these reasons, a blowout preventer may become difficult or impossible to operate in a relatively short time if left untouched.

It is obviously time-consuming to check preventers a little oftener than absolutely necessary, but it is certainly better and cheaper than finding one inoperative when it is needed. This applies just as much to shallow digging where the mud is full of sand as to deeper digging where the probabilities of kicks are increased.

Inspection . . . Blowout-preventer packing elements such as gaskets should be carefully inspected on each installation or change. Preventers represent a lot of value if they are in good condition and no value at all if they are not in good condition. The difference may be a small amount of time and effort and a relatively small expenditure for repairs when compared to the value involved.

At regular intervals, not exceeding 1 year, preventers should be shopped for a thorough overhaul and test.

Control system . . . Obviously, the blowout-preventer control-fluid system must be dependable. On steam rigs, boiler feed water is suitable. The pumps may be compounded if extra pressure is needed. A small leak or bleed-off can let preheated feed water keep the supply line to the preventers from freezing in cold weather.

On power rigs, there is a general preference for an independent, stored-up source of power for closing blowout preventers because it is often desirable to shut down all engines and electrical equipment that might be a source of sparks when a well begins blowing gas.

The usual power storage is compressed air or nitrogen. In some cases, the blowout-preventer control fluid is stored directly against compressed-nitrogen pressure at about 1,500 psi. In other cases, compressed air is stored at up to 250 psi., and this is used to operate fluid pumps which may deliver up to the rated pressure of the blowout-preventer actuating chambers.

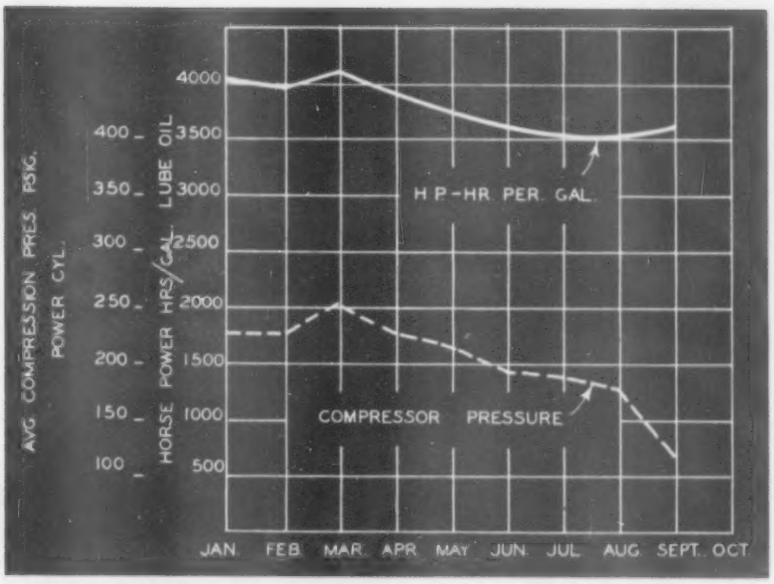
For either type, it is desirable to have the storage volume provide for closing at least the most important parts of the blowout preventer assembly immediately after a routine drill in which all the preventers have been operated for test.

Control manifold . . . The control manifold should be as simple as possible and plainly labelled so almost anyone can understand what to operate. It is usually desirable to differentiate the master-gate (or blind-rams) control so it will not be mistakenly operated while drill pipe is in the hole. Mashed drill pipe might seriously complicate any subsequent operations.

All piping and connections should be as foolproof as possible. Hose, tubing, or gage connections that might fail in a flash fire should be avoided because they might let control-fluid pressure get away before preventers could be operated.

The most generally desirable position for blowout-preventer controls is at a point the driller can get to immediately. Usually this means at the derrick-floor level and on the driller's side of the rig.

One or more remote-control stations may be very desirable. One simple system is to have a fluid-pressure supply from the main storage, or from the rig-water pressure, or from a small hand pump at the remote station which directs fluid to a piston which operates the handle of the main blowout-preventer control valve.



TIMING of shutdown schedules for field-compressor units is based on these curves, along with a monthly capacity and per cent load report. Fig. 1.

How Calco Times Maintenance To Cut Field Compressor Costs

by F. Lawrence Resen
Gulf Coast District Editor

A PREVENTIVE maintenance schedule for field compressors has been set up by The California Co.'s western division at Rangely field, Colorado, to serve two key purposes: (1) as insurance on the costly investment these units represent; and (2) to maintain high operating efficiency and hence lower costs by avoiding unscheduled shutdowns.

ENGINE		
UNIT NO.	1	
MAKE		
PRESSURES	In	Out
1. Scavenging Air		
2. Fuel Gas		
3. Lube Oil		
TEMPERATURES		
1. Lube Oil		
2. Cooling Water		
3. Average Exhaust		
R.P.M.		
OIL ADDED, gallons		
DOWN TIME, hours		
1. Repairs		
2. Other Operations		
COMPRESSORS		
Cylinder No. 1	Temp.	Press.
Suction		
Discharge		
Cylinder No. 2		
Suction		
Discharge		
Cylinder No. 3		
Suction		
Discharge		
VOLUME GAS HANDLED—ENTIRE PLANT		
1. Based on instantaneous meter reading		
2. Correct Vol., 24 hr., metered and corr. to 15.025 at 60° F.		
GAGER'S SIGNATURE		
REMARKS:		

DAILY log data is recorded by the pumper-gager at the start of each 8-hour shift. Fig. 2.

AVG. VOL. GAS HANDLED—ENTIRE PLANT (From Daily Log)	
DATE	
UNIT NO.	1
MAKE	
COMPRESSION PRESSURES	
Right Cylinder Bank	
Cyl. No.	
1.	
2.	
3.	
4.	
Left Cylinder Bank	
Cyl. No.	
5.	
6.	
7.	
8.	
LUBE OIL USED, Gal. (From Daily Log)	
ENGINE HOURS	
1. This Month	
2. Cumulative to Date	
HORSEPOWER HR./GAL. (CALC.)	
SAFETY DEVICE CHECK	
1. High H.O Temperature	
2. Low Lube-Oil Pressure	
3. Overspeed Governor	
4. Safety Pressure-Relief Valves	
5. Safety Pressure-Relief Valves	
6. High Liquid-Level Shutdown	
(A) First Stage Suction	
(B) Second Stage Suction	
7. Manual Shutdown Switch	
8. Red Warning Light	
CHECKED BY:	

MONTHLY inspection checks are reported on this form which includes both equipment check points and data on fuel and cumulative hours. Fig. 3.

The schedule set up by Calco engineers, covers daily, weekly, monthly, semiannual, and annual maintenance checks for field compressors and compressor engines. It can be modified so that, under mild operating conditions, the period between some of the inspections can be lengthened with appreciable savings and some reduction in downtime. Conversely, individual unit load conditions may be such as to require more frequent inspections.

When recording data the same form is used for several inspections. By having data from several scheduled checks recorded on the same form, any appreciable change in the condition of the engine or compressor can be noted merely by glancing at the record.

In addition to daily and periodic checks, a graph is prepared on the units showing the average monthly horsepower-hours per gallon of lube oil consumed. The average power-cylinder pressure is also shown on this same graph (Fig. 1). These graphs, along with a monthly capacity and per cent load report, are then used as a guide in determining the condition of the units, severity of operation, and tentative shutdown schedules.

Daily log . . . The data called for on the daily log are recorded at the beginning of each 8-hour tour by the pumper-gager (Fig. 2).

The 24-hour volume of gas handled in the entire plant is determined by a field foreman, and then this report filed by the mechanic foreman for a period of 40 days. During this time, any appreciable change from previously recorded data may be easily spotted and corrective measures taken.

To permit the pumper-gager to record instantaneous volume of gas handled at any compressor installation of one or more units, each orifice meter at the field-compressor installation was furnished with a direct-reading chart. With a constant static pressure and an orifice size, the gasman can prepare a chart showing instantaneous volumes of gas handled for each 1/10-in. differential meter reading. Although the figures recorded are not exact they permit the determination of load distribution at any time during each 8-hour period.

Weekly check . . . The lead compressor mechanic is responsible for supervising a weekly engine check. This is designed primarily to insure that the engine is in top operating condition insofar as tappet clearance, magneto points, and engine balance are concerned. No records are kept, but the checkoff is made consistently on the following items:

1. Gas-valve tappet clearance.
2. Magneto points.

3. Check for lube-oil leaks.

4. Check for cooling-water leaks.

5. Check engine balance and rebalance if needed.

6. Check for unusual conditions.

Monthly checks . . . Once each month, the mechanic foreman supervises the inspection of the units and their safety devices. This inspection is used to determine the condition of power-cylinder rings; scavenging-air ports and rings, air cleaner, gas-injection valves, timing, engine balance, and over-all lube-oil consumption.

The form for this work includes checkoff columns on the various cylinders, the cumulative gas handled, and the lube-oil consumed during the period. This information is obtained from the daily log and is supplemented on the form by the figure for horsepower-hours per gallon of oil and monthly and cumulative engine hours. (Fig. 3.)

During the safety check, inspection is made of such items as the high water-temperature alarm, the low lube-oil pressure alarm, the overspeed governor, the safety pressure-relief valves, the high liquid-level shutdown in pertinent stages, the manual shutdown switch, and the red warning light.

Using the data from the form, field engineers prepare the monthly performance report and graph horsepower-hours per gallon of lube-oil consumed and average compression curve.

Semiannual . . . After six months of operation an inspection overhaul and tuneup check is given the units. This check is designed to keep the engines and compressors in top operating condition, to check the condition of minor engine parts and the cooling system, and to determine whether lube-oil should be changed.

The adjustment, cleaning, and checking to be carried out on the 6-month check is completed under the supervision of the mechanic foreman. Should the check reveal that an engine needs a general overhaul, it is referred to the field foreman for coordination with the entire organization and production schedule.

Jobs to be done every 6 months include:

1. Checking and cleaning gas injection valves, starting air valves, and power cylinder ports.

2. Checking and cleaning the air cleaner.

3. Sampling lube-oil and laboratory testing to see if it needs changing.

4. Checking water-cooling system for proper pH and scale, and taking necessary corrective steps.

5. Thoroughly cleaning the outside of all water, gas, and lube-oil cooler coils.

6. Checking and tightening all anchor bolts and engine-frame bolts.

7. Checking and adjusting engine timing and magneto points.

REPAIR DATA NG-6

PLANT — ENGINE FAMILY NO. — FRAME NO. — DATE — ORDER NO.

CYLINDER — MICROMETER READINGS — BY

CYLINDER SIZES — PISTON SIZES

GROUP NO. — POSITION — No. 1 MAINBEL POSITION* — HEAD END (NO. 2) — CENTER (NO. 3) — CRANK END (NO. 4) — CRANK END

C.W. (FOR) — C.C.W. (AFT) — C.W. — C.C.W. — C.W. — C.C.W. — C.W. — C.C.W. — C.W. — C.C.W.

1 OR 5 OR L
2 OR 6 OR R
3 OR 7
4 OR 8

PISTON ROD — MAX. DIAM. — MIN. DIAM. — SCORED — SHOULDERS

ABOVE RING TRAVEL

PISTON RING RECORD

CYL. — GROUP NO. — RINGS ON — RINGS OFF — CYL. — GROUP NO. — RINGS ON — RINGS OFF

NEW USED — SIDE OR RING NO. — RING CLEAR — END GAP — KIND OF RING — CONDITION — NEW USED — SIDE OR RING NO. — RING CLEAR — END GAP — KIND OF RING — CONDITION

1 OR L OR 5 OR 7 — 2 OR 6 OR R — 3 OR 7 — 4 OR 8

COMPRESSOR PISTONS — 1 DIAM. STROKE — 2 — 3 — 4

RING GROOVE DIMENSIONS — WIDTH — DEPTH — WIDTH — DEPTH — WIDTH — DEPTH — PISTON ROD DIA.

BEARING RECORD

LOCATION — PIN DIA. — SPOT — KEY — AMT. OF TAKE UP — CONDITION — LOCATION — SHAFT DIA. — SPOT — KEY — AMT. OF TAKE UP — CONDITION

1 OR L CR — 2 OR R CR — 3 CR — 4 CR — 1 OR L W. PIN OR X HD. — 2 OR R W. PIN OR X HD. — 3 W. PIN OR X HD. — 4 W. PIN OR X HD.

1 OR L, MAIN — 2 OR C. MAIN — 3 OR R. MAIN — 4 MAIN — 5 MAIN — THRUSTAL

WASHED JACKETS OF — ENG. — COMP. — CHANGED OIL OF — ENG. — COMP. — OIL USED — NEW OIL

(GIVE DATA ON VALVES, SEATS AND GUIDES—KIND, WHETHER REPLACED OR REFACED, CONDITION, ETC.)

FOREMAN

ANNUAL inspection statistics are recorded on this repair data sheet which holds a complete statistical record of engine condition and performance. Fig. 4.

Annual inspection . . . This is a thorough check on the condition of piston rings, scavenging ring, connecting rods and bearings, and main bearing. This work is done by the lead compressor mechanic under the supervision of the mechanic foreman. The statistical part of the check is recorded on Form NG-6, Fig. 4. The mechanic foreman decides which minor ports should be repaired or replaced, while major work requires the approval of the field foreman to insure coordination of all field activities.

The statistical record is quite complete, with micrometer readings taken and recorded on cylinder sizes and piston sizes. A piston-ring record is maintained showing condition of all rings, while a similar record is kept showing the condition of the ring grooves on the pistons. A record is kept on the bearings which lists the condition of the individual bearings and the amount of takeup. Supplemental information is included with data on valves—their seats and guides, kind, whether replaced or refaced, condition, etc.

Prevent Major Overhauls

To avoid the economic loss due to downtime and curtailed production, Calco emphasizes that major overhauls should not be undertaken unless definitely needed. Frequent inspections work toward this end by catching minor troubles before they develop into major ones.

In addition to the preventive-maintenance work, emphasis is placed on adherence to proper starting, stopping, loading, and unloading procedures by operating personnel. These procedures, plus the routine maintenance completed every 8-hour tour, are part and parcel of the over-all program which keeps costs down and efficiency up.

The Fluid-Operated Valve

. . . A new method of gas lift

by W. B. Adair

THE chief difference between the conventional pressure-operated gas-lift valve and the fluid-operated valve lies in the design of the mandrel. The mandrel arrangements for the fluid-operated valve seals the valve bellows from the casing pressure, and the pressure exerted by the fluid column in the tubing is the predominant valve-opening force. As in pressure-operated valves, the bellows is the prime moving force.

However, on the fluid-operated valve, the bellows keeps the valve closed until a desired predetermined head of fluid has entered the tubing. When the fluid column in the tubing builds up a sufficient pressure at the valve to overcome the charged pressure of the bellows, the valve stem is lifted off its seat. Then, gas from the casing annulus is injected through a normally closed check valve into the tubing. This discharges the accumulated head of fluid.

When the tubing pressure opposite the valve becomes lower than the charged pressure of the bellows, the valve immediately closes. It stays closed until another fluid head is built up in the tubing sufficient to overcome the charged pressure of the bellows. Then the cycle is repeated. Subsequent action is automatic, and unloading from valve to valve is automatic. No time-cycle surface controllers or "purgers" are necessary.

These are the features which the fluid-operated valve is intended to offer over the pressure-operated valve:

1. To apply full available line pressure to the operating valve in the well.

2. To reduce injection gas-fluid ratios by allowing the well's producing characteristics to control the amount of fluid produced in each cycle and, thereby, the number of cycles.

3. To reduce slippage by fixing the height of the liquid column lifted.

4. To reduce the attention required to produce the well.

5. To increase the versatility of the gas-lift installation so that it will not be necessary to sacrifice efficiency or to pull the tubing when producing characteristics of the well change (as when water cut increases).

6. To prolong flowing life on "twilight wells" by unloading them when necessary. This is done with either formation gas in the casing or with injected gas. (Production from such wells might also be increased in this manner.)

The author is with Macco Oil Tool Co., Inc., Houston.

Intermittent flow . . . The intermittently produced gas-lift well usually has a producing capacity of less than 300 bbl. per day, and fluid is produced at intervals in "slugs." In an intermittently produced well fitted with fluid-operated valves, a small choke is installed on the surface at the casing inlet to control the rate of gas injection into the annulus. The size of the choke is adjusted so the fluid head can be lifted from the well with a minimum amount of gas.

At the operating valve, gas injection into the tubing is controlled by the producing characteristics of the well; i.e., the rate at which a column of fluid builds up in the tubing. The advantage of the fluid-operated valve here is that gas is not unnecessarily injected into the tubing when rate of production declines.

Continuous flow . . . If a well condition is such that the flowing bottom-hole pressure will feed past the point of injection at a rate high enough to maintain a pressure opposite the valve greater than that charged in the bellows, the delivery of fluid from the flow string is constant with a minimum of surging. Gas is injected into the tubing string at a constant rate by the casing inlet choke at the surface. With this installation, flow rate may be varied from relatively small to extremely large volumes by controlling the size of the casing inlet choke.

This installation may be produced against a surface choke in the tubing to help regulate fluid volume. The fluid-operated valve eliminates the necessity of a line purger because the operating valve maintains a constant flowing gradient by injecting gas as the gradient changes.

Valve spacing . . . In typical fluid-operated valve installations, spacing usually follows the simple rule of "foot per pound." For example, available gas of 500 psi. calls for 500-ft. spacing between valves. On wells with very high productivity indices, placement of valves is of prime importance and must be considered. Given normal field data, either a graphical analysis or a mathematical analysis may be made to determine the proper placement of valves to lift the desired amount of fluid.

Since fluid-operated valve installations may be designed to utilize full available operating gas pressure at the valve, calculations are usually less involved than in conventional "casing-pressure-operated" valve installations.

Valve spacing in continuous-flow wells is essentially the same as in intermittent-type wells. However, in large volume wells (700 bbl. per day or more), the bottom valves are normally spaced closer together to give the operator greater flexibility in changing the operating valve. The operating valve may be changed by adjusting the inlet-choke size until the fluid gradient is lowered or raised as desired, thus changing the point in the tubing where the available gas will continuous-flow the desired fluid production.

Dual completions . . . The fluid-operated valve is particularly adaptable to dual completion wells. A typical dual installation consists of two strings of tubing strapped together to be run in tandem inside the casing. Since tubing pressure controls the opening of both strings of valves, "valve interference" is eliminated. The casing annulus serves as a gas-volume chamber, and gas is admitted into each tubing string as needed. No surface equipment other than a casing inlet choke is needed.

Field Cases

To illustrate the design of gas-lift installations with fluid-operated valves, let's look at three actual wells. The first well is a borderline case, but it is known that:

Total depth of well, ft.	6,050
Static bottom-hole pressure, psi.	2,545
Productivity index	0.8+
Total fluid desired, bbl. per day	600+
Tubing size, in.	2½
Casing size, in., o.d.	7
Gradient of well fluid, psi. per ft.	0.47
Available kickoff gas pressure, psi.	680
Available operating gas pressure, psi.	640
Tubing and annulus loaded with salt water.	

The following is the manner in which the actual installation was made:

Intermittent and Continuous-Flow Wells

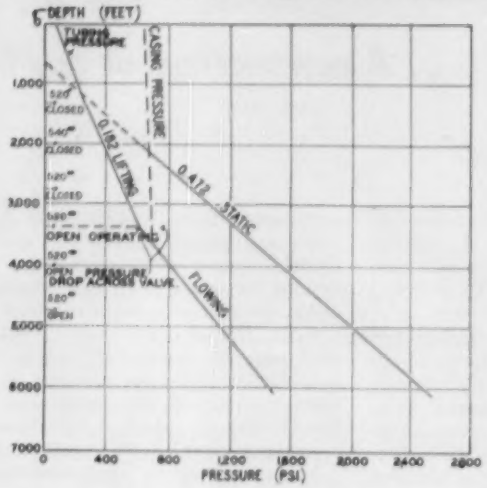


Fig. 1.

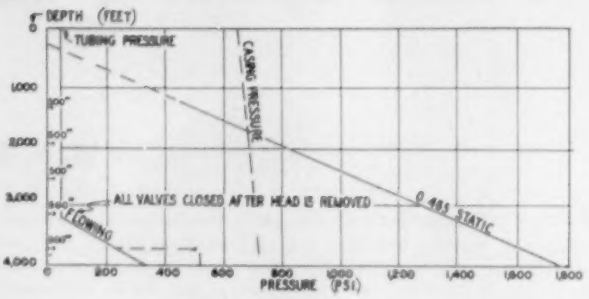


Fig. 2.

The graph on the left is an actual record of a flowing and static bottom-hole pressure of a continuously-lifted well. Gas is injected at the fourth valve, and there is no tubing choke. Casing-inlet choke is 6/64 in.

The record above is a flowing bottom-hole pressure record of an intermittently lifted well. It has just made a head of fluid and all the valves are closed. When the fluid builds up enough to open the bottom valve, gas will be admitted to the tubing. There is no tubing choke, but casing has a 12/64-in. choke.

Valve No.	Spacing (ft.)	Depth (ft.)	Valve pressure (psi.)
6	1,300	1,300	540
5	700	2,000	540
4	700	2,700	520
3	600	3,300	520
2	700	4,000	520
1	700	4,700	520

This well has an intermediate productivity index, so the gas lift installation was designed to handle either intermittent or continuous-flow operation. The **exact** productivity index was not known, and the percentage of salt water at high rates of flow could only be estimated. The No. 3 valve was placed at 3,300 ft., the calculated maximum depth of continuous flow with 640 psi. available operating gas pressure. Two valves were placed below 3,300 ft., in case the productivity index was lower than the data indicated, and the production of well fluid became an intermittent-type lifting operation. Thus, the four valves set at 520 psi. would slug the fluid heads as intended in fluid-operated valve design. The two top valves, set at 540 psi., were intended only as unloading valves.

The well intermitted itself for approximately 2 weeks after being turned on production. But, when the oil percentage rose to approximately 25, the well adjusted to a continuous-flow operation and has remained so to date. Fig. 1, illustrating this well, is an actual static and flowing bottom-hole pressure traverse. Total fluid production on the test in conjunction with the pressure traverse was 700 bbl. per day, 72 per cent salt water. Injection gas-fluid ratio was 83 cu. ft. per bbl.

An intermitting case . . . In this well, the following was known:

Total depth of well, ft.	4,000
Static bottom hole pressure, psi.	1,760
Productivity index (approx.)	0.3
Total production desired	Full well capacity
Tubing size, in.	2
Casing size, in., o.d.	5½
Gradient of well fluid, psi. per ft.	0.465
Available kick off gas pressure, psi.	650
Available operating gas pressure, psi.	650
Tubing and annulus filled with salt water.	

The actual gas-lift installation was made as follows:

Valve No.	Depth (ft.)	Spacing (ft.)	Valve pressure (psi.)
5	1,345	1,345	500
4	1,945	600	500
3	2,545	600	500
2	3,145	600	500
1	3,745	600	500

This well has a low productivity index. Therefore, the well was valved to as near bottom as possible. Four valves set 650 ft. apart would not reach bottom, so five valves were needed and were set 600 ft. apart. Maximum fluid per day since being turned into production has been 65 bbl. The well intermits 2.7 bbl. per "kick" once each hour (salt water is 40 per cent). The input gas-fluid ratio was calculated to be 650 cu. ft. per bbl.

Fig. 2 illustrating this case is actual static and flowing bottom-hole-pressure traverse. The flowing-pressure traverse was made after a head of fluid was produced into the stock tank and the wellhead pressure returned to normal separator pressure. So it shows the approximate minimum pressures of an intermitting cycle for the well.

The bottom valve opens when tubing pressure opposite the valve builds up to 525 psi. and the head is lifted to the surface.

High fluid production . . . In the third well, the following was known:

Total depth of well, ft.	5,100
Static bottom-hole pressure, psi.	1,805
Productivity index, bbl. per psi.	11.0
Total fluid desired	Well capacity
Tubing size, in.	2½
Casing size, in.	7
Gradient of well fluid, psi. per ft.	0.45
Available kick off gas pressure, psi.	500
Available working gas pressure, psi.	475
Well killed with salt water.	

The actual gas lift installation was made as follows:

Valve No.	Depth (ft.)	Spacing (ft.)	Valve pressure (psi.)
4	965	960	325
3	1,435	470	325
2	1,900	465	325
1	2,205	305	325

This well has a high productivity index and was designed to lift as much fluid as possible when the water percentage increases. Assuming the productivity index is correct, the 475-psi. gas should lift approximately 900 bbl. per day from 1,900 ft. The fourth valve was placed at 2,205 ft. in case the productivity index was less than 11.

Well production now is held to 280 bbl. of fluid per day by a 24/64 tubing choke. Salt-water production is 87 per cent. The inlet casing choke is 10/64. The input gas-fluid ratio is 214 cu. ft. per barrel (higher than average due to the small tubing choke which holds the back pressure to approximately 150 psi.).

Pipelines and refineries are changing the

SUPPLY PICTURE in the PACIFIC NORTHWEST

Pipelines

As shown on sketch map above and individual maps in this special section

Refineries in Operation

	Crude Capacity
BRITISH COLUMBIA	
1. Standard Oil Co. of British Columbia, Vancouver (North Burnaby)	11,000
2. Shell Oil Co. of Canada, Ltd., Vancouver (Shellburn)	15,000
3. Imperial Oil, Ltd., Vancouver	22,500
4. Royalite Products, Ltd., Kamloops	5,000
WASHINGTON	
1. General Petroleum Corp., Ferndale	35,000
2. Shell Oil Co., Anacortes (Under Construction)	50,000
Plus two asphalt plants:	
3. Union Oil Co. of California, Richmond Beach (N. Seattle)	3,500
4. American Bitumuls & Asphalt Co., Edmonds (N. Seattle)	4,400
OREGON	
1. American Bitumuls & Asphalt Co., Portland	6,500

Refineries Planned

1. Sunset Oil Co., Portland, Ore.	20,000
2. Pacific Oil & Refining Co., Tacoma, Wash.	10,000

Petrochemical Plant Planned

1. Columbia River Chemicals Co., Attalia (Pasco), Wash. (Ammonia and Urea Plant) — $12,000,000

Petroleum Demand

Current total demand in Pacific Northwest, bbl. daily		305,000
Washington, Oregon, and Northern Idaho	260,000	
Lower British Columbia	45,000	

Current Sources of Supply and Approximate Amounts

By pipeline from Alberta, bbl. per day	55,000
By products lines from Montana and Utah refineries, bbl. per day	35,000
Produced in Vancouver plants, bbl. per day	45,000
Produced in Washington (General Petroleum plant), bbl. per day	26,000
By tanker from California refineries, bbl. per day	144,000

In 1950, before either of the products lines or the Canadian crude-oil line were built, the entire Northwest demand was being supplied by tanker from California, aside from the small output (28,350 bbl.) of the three Vancouver refineries.

Future demand is expected to increase at about 4 per cent rate per year.

. . . turn the page to start of special section ⟶

GENERAL PETROLEUM'S 35,000-bbl. plant as it appears from the air. This plant has gone on stream at Ferndale, Wash. This is one of the largest refineries in the "Evergreen Empire."

Refineries Rise, Pipelines Hurdle Barriers

by D. H. Stormont
West Coast District Editor

NEW refineries, pipelines, and other projects of the petroleum industry in the Pacific Northwest, currently the region's most significant industrial development, are causing considerable shifting of fuel and energy supply patterns.

In an area heretofore supplied by tanker from California fields, Canadian crudes have taken over a portion of the market. Both sources are competing with refined products from Rocky Mountain refineries.

All three are competing with Middle East and Venezuela crudes. Low tanker rates make these cheaper than either Canadian or California crudes.

Next year will see natural gas battling for a substantial portion of this market, where petroleum now is the principal fuel. First supplies will come from the San Juan basin of New Mexico. The following year Canadian gas from Alberta's Peace River field will enter the picture.

The Pacific Northwest has almost doubled in population since 1940 and is exceeded only by California in rate of growth. Without proved commercial petroleum reserves of its own, on a per capita basis it consumes almost twice the United States average. It is the only heavily populated section of the country not now served by natural gas.

Of its regional energy consumption, petroleum supplies almost 48 per cent. Hydroelectric power is second with about 42 per cent. Manufactured gas accounts for only a small portion of the remaining 10 per cent. National energy sources are crude oil 41 per cent, natural gas 23 per cent, coal 32 per cent, and water power 4 per cent.

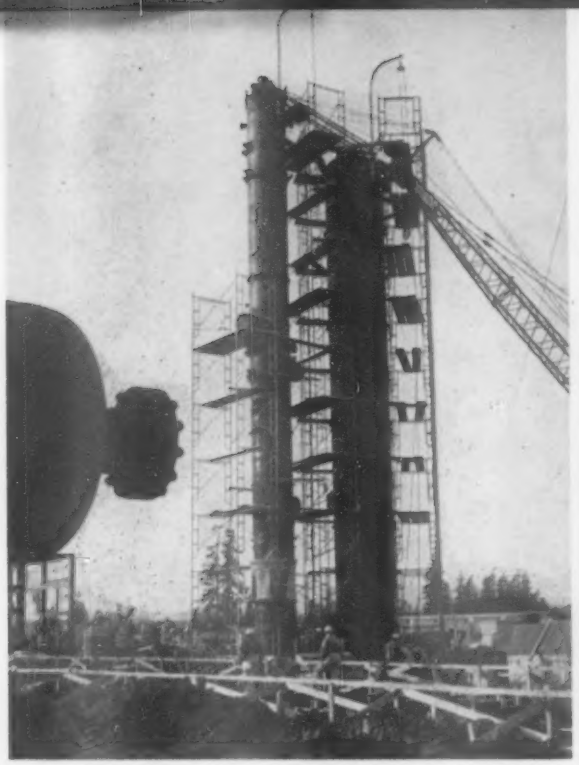
In this battle for supremacy the main bout will be between petroleum and natural gas. Electricity will feel the inroads of gas to a lesser extent. Because demand may continue the 4 per cent annual gain of recent years, any anticipated decline in petroleum product usage may not materialize.

The petroleum picture . . . The current regional demand of 300,000 bbl. daily compares with one of 250,000 bbl. in 1950 and an estimated 330,000 bbl. by 1960. Washington, Oregon, and northern Idaho are using about 260,000 bbl. of petroleum products daily. About 40,000 bbl. of this is in the "Inland Empire" around Spokane. In lower British Columbia area around Vancouver about 40,000 bbl. is used daily.

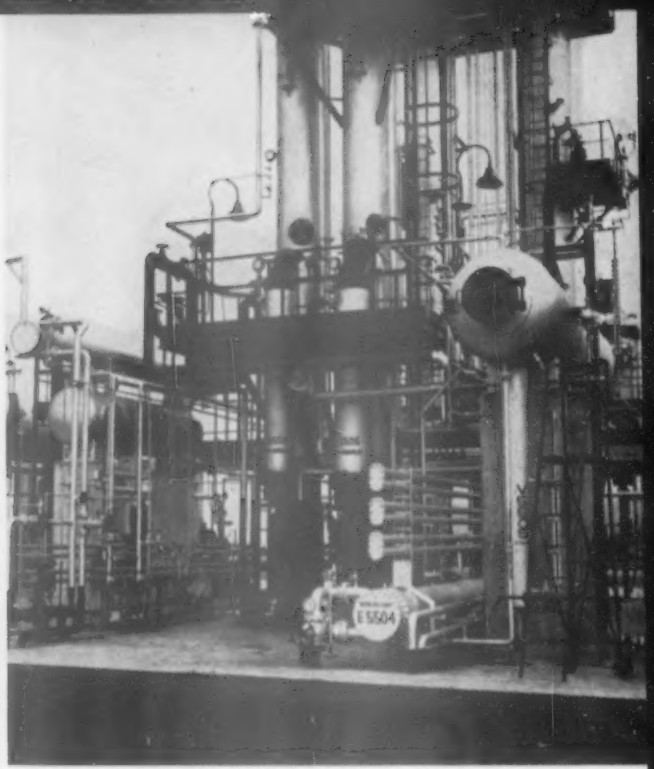
Historically more than 90 per cent of the area's petroleum demands have been supplied from California fields. Aside from 25,000 bbl. of crude for three small Vancouver refineries, all supplies came as finished products.

First major change in this situation was when Trans Mountain Oil Pipe Line Co. in 1953 constructed a 720-mile, 24-in. line from Edmonton to Vancouver. Last year the line was extended to Ferndale, Wash., some 15 miles south of the Canadian border.

Availability of these crudes on the West Coast resulted in the capacity of



SHELL OIL'S crude unit at Anacortes, Wash., with side strippers in background. Pump foundations are being poured.



STANDARD OF BRITISH COLUMBIA'S phosphoric acid-on-quartz cat poly unit at North Burnaby, B. C.

to Serve Last Large Section of U. S.

the three Vancouver refineries being doubled to 50,000 bbl. At Kamloops, 200 miles northeast, a new 5,000-bbl. plant was built as a result of the line.

Biggest step toward the region refining all its petroleum supplies occurred about the first of the year. General Petroleum Corp. placed its 35,000-bbl. Ferndale plant on stream. (Features of this new supply source are described beginning on page 113.)

A still larger step will be completed by Shell Oil Co. at its 50,000-bbl. plant at Anacortes, 30 miles south of Ferndale. When it goes on stream late this year the area will have facilities for 138,500 bbl. daily, almost half of its total petroleum demand.

Two independent refineries have been announced for Tacoma and Portland. At the former, Pacific Oil & Refining Co. plans a 10,000-bbl. plant. Sunset Oil Co. may build a 20,000-bbl. plant at Portland if original plans are carried out.

Other major West Coast companies may join this march to the north. Standard Oil Co. of California has bought a 2,000-acre tract near Mukilteo, also in the Seattle region, anticipating that marketing conditions will make it desirable to erect a refinery there. Richfield Oil Corp., with substantial markets in the Pacific Northwest but no refining facilities north of Los Angeles, likewise is a likely prospect.

The 50,000-bbl. refinery of Shell will cost about $75,000,000. First units will start coming on stream in midsummer and all will be completed by December. Bechtel Corp., contractor for the entire plant, will employ about 2,500 men when full-scale work gets under way this spring.

Basic components of the Anacortes refinery will be a crude-distillation unit, feed-preparation section, catalytic cracking unit, Platformer for upgrading straight-run naphtha, a catalytic polymerization unit, and gas-recovery section. All will be highly integrated.

The feed-preparation unit will be of particular interest. Propane deasphalting has been an established lube-oil treating process for years. This will be the first application of the process for feed preparation. Other features of the plant will include extensive facilities for eliminating air and water pollution.

Data as to the type and size of the principal process units in the area's refineries are shown in Table 1. It will be noted none of the Vancouver plants have reforming equipment. These obtain sufficient high-octane gasolines through catalytic cracking and cat poly units. For the small amounts of aviation gasolines needed, high octane blending materials are tankered in from California refineries or shipped in by rail.

What's at stake . . . Portion of the Pacific Northwest south of the border, i.e. Washington, Oregon, and North Idaho, has a population of about 5,000,000. This compares with one of 3,500,000 in 1940. Oregon is expected to double its 1950 population by 1975. Washington will have 80 per cent more by then. The Canadian portion probably will show an even higher rate of increase.

Consumption of petroleum products has increased by about 2½ times in the 15-year period since 1940. This regional gain compares with about a

VANCOUVER LOADING DOCK completed by Trans Mountain Oil Pipe Line Co. on Burrard Inlet, near Vancouver. It is capable of delivering 20,000 bbl. hourly to ocean-going tankers.

"Consumption of petroleum products has increased 2 1-2 times since 1940"

100 per cent increase in national usage during the same period.

. . . **Gasoline demand** has shown about a 25 per cent gain during the past 5 years. Bulk of this demand is in Washington, which has more than 1,100,000 autos. Gasoline demand there averaged about 52,000 bbl. daily last year. In Oregon it was approximately 37,500 bbl.

. . . **Petroleum fuels** account for a relatively high proportion of total oil demand because the region has no supplies of its own. Based on 11-month Bureau of Mines figures, consumption of stove and diesel oils in Washington last year averaged 39,000 bbl. daily; that of residual fuel oil, 40,500 bbl. daily. In Oregon demand for these products averaged about 23,000 and 26,500 bbl. daily, respectively. This demand was in the following uses:

WASHINGTON

	Diesel & stove oil	Residual fuel oil
Railroads	2,300	1,500
Vessels	1,400	5,500
Utilities	(*)	2,500
Industries	1,700	21,300
Space heating	28,500	7,900
Company and other uses	5,100	1,800
Total	39,000	40,500

OREGON

	Diesel & stove oil	Residual fuel oil
Railroads	2,600	3,600
Vessels	400	3,000
Utilities	(*)	7,100
Industries	1,900	7,200
Space heating	14,300	4,600
Company and other uses	3,800	1,000
Total	23,000	26,500

*Less than 100 bbl. daily.

Role of Canadian crudes . . . Changed tanker rates have materially slowed development of a West Coast market for large quantities of Alberta crudes. When Trans Mountain started work on the Edmonton-Vancouver carrier, high tanker rates made such a line highly feasible. Last summer, when tanker rates were at approximately USMC minus 50 per cent, instead of the plus 50 they were 2 years earlier, both Middle Eastern and Venezuelan crudes could be laid down in the Northwest at prices below comparative Alberta crudes.

With tanker rates currently seasonally higher, in the range of USMC flat to minus 25 percent, Canadian crudes are about at a standoff with these foreign crudes. Comparable California crudes laid down in the Ferndale area are about 20 cents more than Canadian crudes.

Current price for 34°-gravity Redwater crude at Ferndale is $3.35. This is based on a price at the Edmonton terminal of $2.645 (U.S.) per barrel. It includes a pipeline tariff of 47 cents plus 10.5 cents import duty.

J. G. Spratt, Trans Mountain president, in a recent Toronto address, asserted prospect of Canadian crude entering the California refinery market is "bleak." A cut of 30 to 35 cents per barrel needed to make them competitive would not bring a large market, he declared. Opinion of many people familiar with the situation is that such an adjustment in price is not likely in the near future.

During the last quarter of 1954 when about 15,000 bbl. daily was being shipped for the General Petroleum Ferndale refinery, shipments through the Trans Mountain line averaged 50,000 to 55,000 bbl. daily. During this quarter, with the same size shipments for Ferndale, they are expected to average almost 60,000 bbl. daily. Whether or not General Petroleum shifts entirely to Alberta crudes will be determined by tanker rates.

About in August, movement for the Anacortes refinery will be started. Amount of Canadian crude to be used has not been announced but it is anticipated it will make up more than half of

STANDARD OF CALIFORNIA tanker unloading refined products at Eastsound, Wash., terminal. Erection of a new refinery at the near-Seattle site would halt such long tanker hauls.

". . . battleground for products from Mountain, Canadian, and California crudes"

TABLE I—REFINERIES SERVICING THE PACIFIC NORTHWEST—COMPLETED OR BEING BUILT

(Capacities in barrels per stream day)

Company and plant location:	Crude oil	Catalytic cracking	Catalytic reforming	Catalytic poly.	Asphalt
American Bitumuls & Asphalt Co., Portland, Ore.	6,500				4,200
American Bitumuls & Asphalt Co., Seattle, Wash.	3,500				2,600
General Petroleum Corp., Ferndale, Wash.	35,000	20,000	6,000	2,000	6,000
Imperial Oil, Ltd., Ioco (Vancouver area)	22,500	7,600		1,200	700
Royalite Products, Ltd., Kamloops	5,000	1,350		100	500
Shell Oil Co. of Canada, Ltd., N. Burnaby	15,000	5,000		400	550
Shell Oil Co., Anacortes, Wash.	50,000	(*)	(*)	(*)	(*)
Standard Oil of British Columbia, Ltd., N. Burnaby	11,000	7,500		900	500
Union Oil Co., Edmonds, Wash.	4,450				(*)

(*) Not announced.

the 50,000-bbl. charge. Shell is expected to bring in some excess residual oil from California refineries for further processing. Likewise, any excess light crude may result in the new refinery taking over some of the market formerly supplied from California. Thus during the last few months of the year, shipments probably will be about 90,000 or 100,000 bbl. daily, and for the entire year may average 75,000 bbl. daily.

How soon the line will be transporting 150,000 bbl. daily, or when it will be enlarged to its 300,000-bbl. ultimate capacity, depends on several trends. Most important probably is whether tanker rates stay at the current low level, as is anticipated for the next several years.

Another factor will be whether other large refineries are added there. Erection of substantially more capacity would have the dual effect of increasing the market for Alberta crude as well as possibly lowering pipeline tariff, thereby making the crude more competitive.

From the long-term viewpoint, the Pacific Northwest in all probability will be supplied by Alberta crudes. California crude will be competing for the market for some time to come. Oil-discovery rates of recent years, however, foretell that California fields in a few years will be able to supply only local demand.

Entry of natural gas into the area will tend to complicate the demand picture, as is discussed later. What has happened in California, where about 1,400,000 M.c.f. of natural gas is displacing the equivalent of 230,000 bbl. of crude daily, may occur to a small degree in the Pacific Northwest.

Products pipelines . . . New products pipelines into the Spokane area have resulted in this intermountain area becoming a battleground for products from Rocky Mountain, Canadian, and California crudes. The latter are barged up the Columbia River to Pasco and then taken by tank truck the remainder of the distance.

Most recent carrier was the 30,000-bbl. line from Billings, Mont., to Spokane, completed last September by Yellowstone Pipe Line Co. Jointly owned by Carter Oil Co., Continental Oil Co., Union Oil Co., and Husky Oil Co., the 537-mile line serves as a western outlet for Montana refineries—which earlier lost a portion of their mid-western market to new Williston basin fields and refineries.

The other pipeline bringing products into eastern Washington is that of Salt Lake Pipe Line Co. In 1950 the line was completed between Salt Lake City and Pasco, Wash.; last year it was extended to Spokane, where it can deliver

THE NEW PIPELINES . . .

Pacific Northwest Pipe Line Corp.

COMPLETION of the planned Pacific Northwest and Westcoast gas lines will bring Rocky Mountain and Canadian gas into an area which now depends upon petroleum for 60 per cent of its fuel and power. Historically supplied by tanker from California, the area now receives 60,000 bbl. of its 300,000 bbl. daily petroleum requirements through the Trans Mountain crude line. Additional supplies are in the form of finished products via pipelines from Montana and Utah refineries.

Westcoast Transmission Co., Ltd.

Trans Mountain Pipe Line Co.

15,000 bbl. daily. Portion of the line to Boise, Idaho, has a 40,000-bbl. capacity; that to Pasco is 22,500 bbl. daily. At Pasco, terminal products also are shipped by barge to the Portland-Vancouver market.

When gas is available . . . The three-way deal completed between Pacific Northwest Pipe Line Corp., Westcoast Transmission Co., Ltd., and El Paso Natural Gas Co. last December, represented the biggest gas-transmission deal in history. Costing in the neighborhood of $400,000,000, it will involve construction of about 2,600 miles of main lines.

As a result of the deal, Canadian gas will be available in Washington and Oregon, as well as in California. In addition the Pacific Northwest will be linked to gas-producing regions of the Rocky Mountains.

The schedule calls for Portland and Seattle to start receiving San Juan basin gas in the summer of 1956. Canadian gas will reach Vancouver and the United States in late 1957 *(The Oil and Gas Journal, December 20, 1954, page 58).*

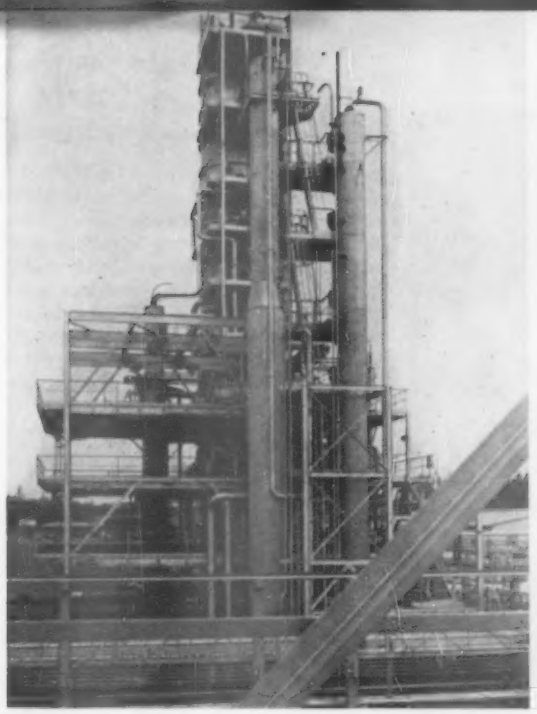
When natural gas is available in the Pacific Northwest, it is expected that it will make some inroads on petroleum's market. Its net effect will be to supplement rather than replace the present energy sources, however.

Extent to which it replaces petroleum will depend to some extent upon price at which natural gas is made available. Residual fuels currently are about $2.10 per barrel. On an equivalent energy basis this is comparable to 35-cent per M.c.f. natural gas.

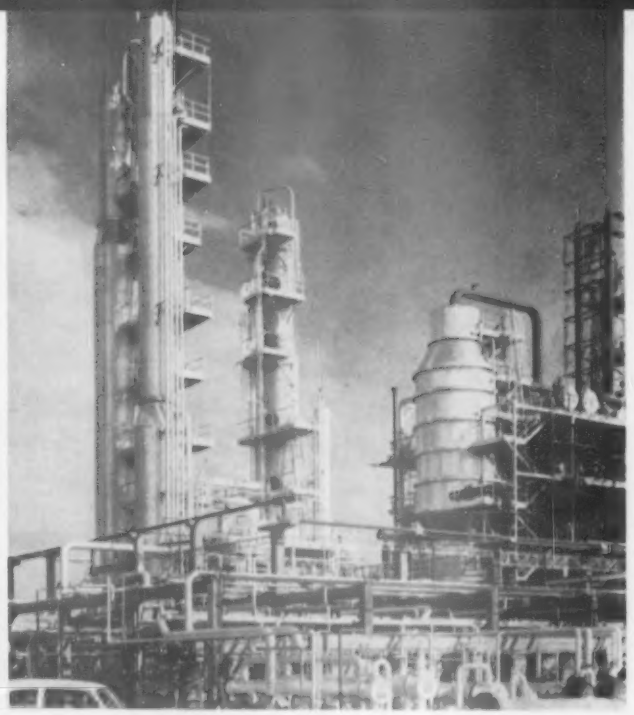
Peace River producers reportedly will receive about 10 cents per M.c.f. for gas at the well head. Approximate price at which this gas will be made available to Pacific Northwest at the boundary has been reported to be 22 cents. Under such a schedule gas could be sold to industry in Washington and Oregon at prices sufficiently low to make it worth while for companies to install facilities for burning gas on an interruptible basis.

Gas utilities in the area have extensive programs for expansion and conversion to facilitate the distribution of natural gas. It is estimated these will cost $100,000,000 during the first 5 years. In domestic use it is anticipated distributors will concentrate first on use of gas for space heating, water heating, refrigeration, and clothes drying; then later, as a fuel for cooking.

While price of gas will not be cheap enough to promote an extensive heavy industry to the Pacific Northwest, it may enable such industries as ceramics, glass making, food processing, cement, plywood, pulp and paper, etc. to become established. Petrochemical plants also may find the area attractive because of its rapidly growing chemical markets. This is evidenced by the $12,000,000 ammonia and urea plant Columbia River Chemicals Co. plans to build near Pasco, Wash.



ENTIRE CRUDE THROUGHPUT of the new refinery is handled in this 35,000-bbl. crude topping unit.



CRACKED VAPORS from the T.C.C. unit are processed in the gas-recovery section at left of the vacuum tower.

Washington Gets First Major Refinery

General Petroleum's Ferndale plant has 35,000-bbl. capacity

by D. H. Stormont
West Coast District Editor

GENERAL PETROLEUM CORP.'s new refinery near Ferndale, Wash., the first major refinery to be built in that state, is featured by its high degree of integration.

Intermediate rundown tankage was eliminated at all points possible. An intermediate product from one unit flows directly, or possibly through a small surge tank, to the unit where it is to be further processed. This feature, coupled with maximum use of heat interchange, results in important fuel and cooling-water savings. It also reduces the number of operators needed.

Another feature of the 35,000-bbl. plant will be easy maintenance. Units were designed for ready access of mobile servicing equipment. Wide use was made of monorails and service platforms.

Though the refinery is designed for a capacity of 35,000 bbl. daily a number of the component units are rated higher. Plant capacity thus can be readily increased in the future to about 45,000 bbl. In order to obtain maximum overall throughput capacity, most towers were sized in accordance with the "traffic" in each section.

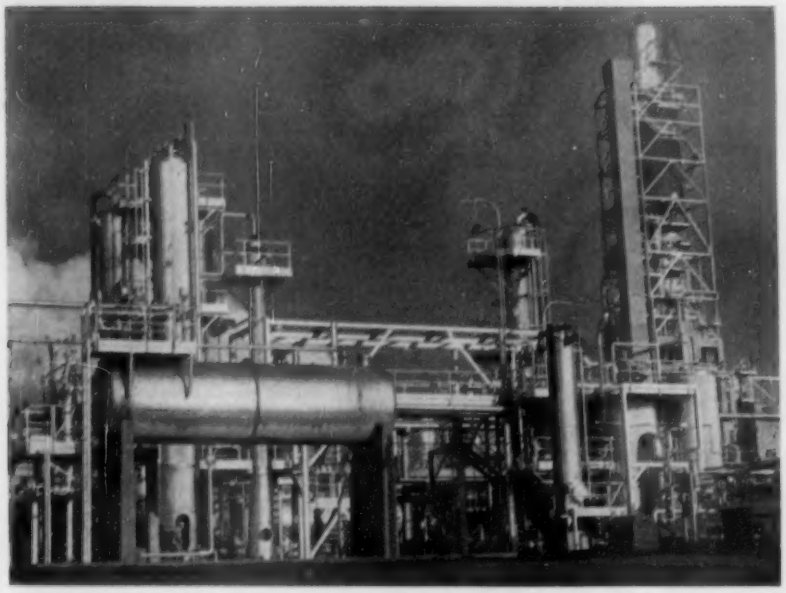
The entire refinery was designed to obtain maximum capacity for gasoline and distillate fuel-oil manufacture from the $38,000,000 outlay. Savings in intermediate tankage was one method of attaining this end. Standby equipment was another. For example, only such pumps as are necessary in emergency operations are provided with standby units. In view of the highly integrated nature of the refinery it was reasoned shutting down of either the crude unit or cat cracker for any length of time would force all others down.

An unusual feature of the plant is the absence of conventional bubble-cap trays in fractionating towers. Only four such trays exist in the entire plant, those in the bottom section of the vacuum tower. All others are Uniflux trays of Socony-Vacuum design. These inexpensive trays consist of interlocking S-members, one side of each section being slotted so uncondensed vapors can move upward.

Another feature, described in greater detail later, is the waste-water treating system. Constructed at a cost of about $1,250,000, it is one of the most extensive installed in any refinery. Some $300,000 were spent on the complete and ultramodern fire protection system.

The refinery is located on an 850-acre site facing Puget Sound near Ferndale, 12 miles northwest of Bellingham and 12 miles south of the Canadian border. Building started on the cleared site in October 1953, and was completed a year later. Bechtel Corp., which designed and constructed the entire refinery, had turned over all units to General Petroleum by last January 1.

Designed to operate on 35°-gravity Redwater-type crude, the plant is served by a spur line of Trans Mountain Oil Pipe Line Co.'s 720-mile line from Edmonton to Vancouver. In addition to this crude, similar types of Eastern



PRODUCTION of high-octane gasolines is accomplished by this 3,500-bbl. catalytic polymerization unit.

Venezuela crudes and some from California's Ventura field have been received by tanker.

Refinery Units

Major processing components of General Petroleum's new refinery are: a single 35,000-bbl. crude-topping unit; 9,000-bbl. vacuum-distillation tower; 6,600-bbl. visbreaker, 20,000-bbl. Thermofor catalytic cracking unit; 6,000-bbl. Sovaformer for upgrading straight-run naphtha; and a 3,500-bbl. U.O.P. catalytic polymerization unit.

Process flow, and products yields on a 35,000-bbl. charge, are shown in the accompanying simplified flow diagram. Processing highlights of the plant include the following:

Catalytic cracking . . . The new T.C.C. unit was the first of the T-100 type (largest size) to be placed in operation. The unit processes 20,000 bbl. daily of which about 15,600 bbl. is heavy-gas-oil fresh feed and 4,400 bbl. is recycle gas oil.

Topped crude from the distillation tower, after passing through the tar-separator heater, is charged directly to the tar separator and not to the vacuum tower as is normally the case. In other words, the vacuum unit is downstream from the tar separator. Bottoms from the tar separator are charged directly to the vacuum tower; no pumping or heater is used between the two.

There is no use made of the vacuum gas oil other than being charged directly to the T.C.C. unit as feed stock. Accordingly, the vacuum unit's operation must conform to that of the cat cracker.

A single air blower provides both the lifting and combustion air for the unit. This consists of a 1,750-hp. electric motor driving a 51,000-cu. ft. per minute blower, discharging at a pressure of 4.5 psig.

Likewise a single steam-driven centrifugal compressor handles all cracked vapors for charging to the gas recovery system. Operating at 6,700 r.p.m., the 1,750-hp. single-drive unit compresses the gases from zero to 160 psig. discharge in two stages.

First Sovaformer . . . The 6,000-bbl. naphtha reforming unit was the first of its type to go on stream. Developed by Socony-Vacuum engineers, the Sovaformer makes use of an extruded platinum-type catalyst.

During early operations of the unit, straightrun naphtha of about 50° A.P.I. gravity was being charged to the unit. Having a boiling range of about 200°-380° F., octane number of the charge stock averaged about 38, clear, and about 65 when leaded with 3 cc.

From this charge stock at the severity level then employed the 52° A.P.I. gasoline was averaging about 90 clear, and 98 when leaded with 3 cc.

Waste-Water System

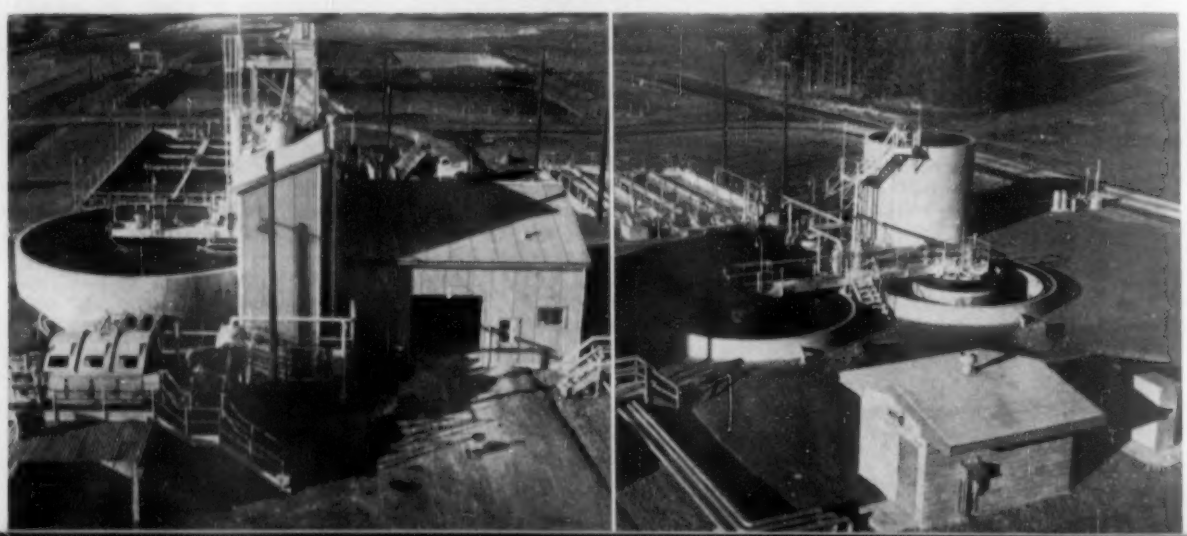
In planning the waste-water disposal and treating system, no effort was spared to protect marine life in nearby Puget Sound. All waste waters are collected in one of four systems: (1) storm, (2) sanitary, (3) oily, and (4) phenolic.

Storm waters are collected and run to a catchment basin, on the effluent side of which are hay filters to remove any oil that may be present. The sanitary waters all run to an underground septic tank.

Oily and phenolic waters, after being treated as follows, are discharged into the sound.

. . . Phenolic waters, including de-

WASTE-WATER TREATING FACILITIES include (left) those for chemically treating oily waters and (right) an activated sludge plant for phenolic waters.



salter effluent waters, sour waters from the overhead accumulator, knockout drums, and polymerization feed wash waters, first are steam stripped. Bottoms from there go to the gravity oil separator and then to the phenolic water surge tank. Overhead gases from both strippers are condensed and run to an incinerator where they are burned with excess air.

An additional source is that from the spent-caustic treating system. Spent caustic is run to a surge tank from which a daily load goes to the flue-gas stripper. Bottoms from the stripper go to an acid-oil separator, or "springing drum." The aqueous phase from this vessel then is steam stripped.

Overhead gases from here are recycled to the flue-gas stripper, where it exits overhead into a common header to join the gases from the desalter and sour water strippers. The stripped and diluted caustic solution is bled continuously to the activated sludge treating plant.

TANKERS of the T-2 type can be handled two at a time, taking on their product cargoes through gravity loading lines.

Treatment of phenolic wastes is carried out by means of a single A.P.I. separator and an activated sludge system. The latter consists of two sludge digesters and two aerators.

The waters, after passing through the 300-g.p.m. separator, are collected in a 10,000-bbl. surge tank. A flow-rate controller on the outlet line maintains an even flow into the activated sludge system. In flowing to the system, it goes to a flocculation basin, en route receiving an injection of coagulant and nutrients (the latter consisting of nitrogen and phosphoric compounds to sustain bacterial life).

From the flocculation basin the raw water flows to the pump pit of the sludge aerators, where they are joined by recycle water from the digestor tanks and the combined stream pumped to the central feed of the two sludge systems. Effluent, after approximately 3 hours' retention time, overflows into a line which carries it to the catchment basin for discharge into the sound.

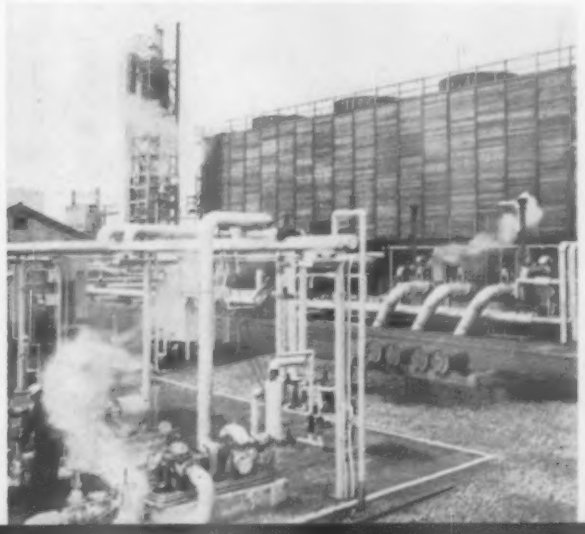
Activated sludge collects in the bottom of the sludge system, from where it gravitates to either of the two aerated digestion tanks. Flowing then to the pump pit, it there mixes with influent for recycle. A small portion of the settled sludge is continuously removed to a sludge thickener and then to an anerobic digestion tank.

... Oily waters, comprised of accumulator waters, cooling-tower blowdown, and that collected from sumps and bled from storage tanks, gravitate to either of two 2,500 g.p.m. A.P.I. separators. Normally operated in parallel, either can handle the entire plant load. After the recoverable oil is skimmed, the water collects in a raw water basin from where it is pumped to the primary mixing and reactor zone of a conventional sludge system treating tank.

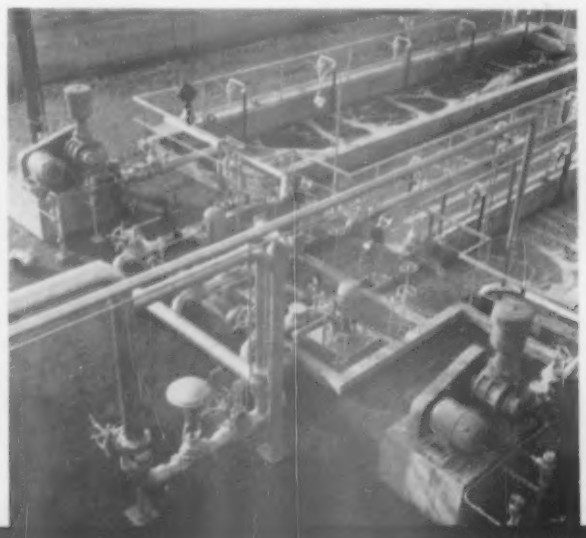
Chemicals introduced in this section of the treater are activated silica, lime, and alum. Ferrous sulfate also is added whenever a batch of soluble sulfide water is anticipated.

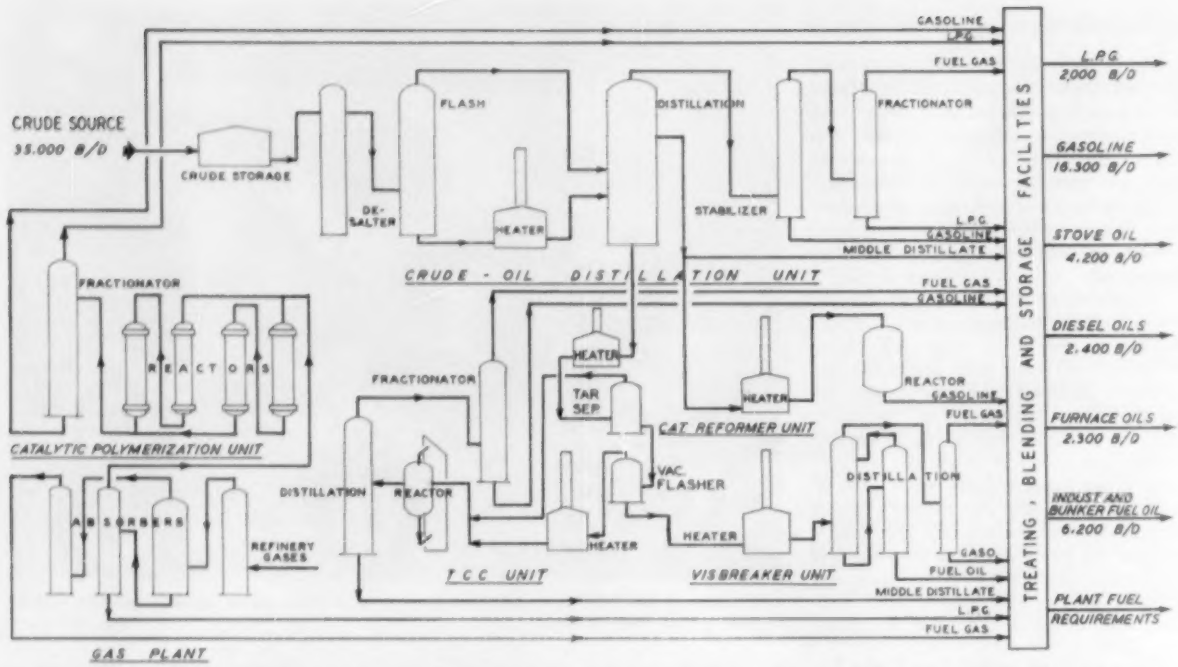
Amount of each chemical injected is automatically regulated to the volume of water passing through the system by a rate-of-flow controller. Rate of sludge withdrawal from the four sludge concentration sections of the treater is time-cycle controlled. The flow-rate controller, however, overides the time-cycle controls whenever volume of water being treated results in an accumulation of sludge. A rotary-type precoat filter removes excess water from the sludge.

FRESH WATER for cooling and other plant uses is obtained from the Nooksack River, 5 miles away.



ACTIVATED SLUDGE from the digesters is joined by fresh phenolic waters in these two sludge aerators.





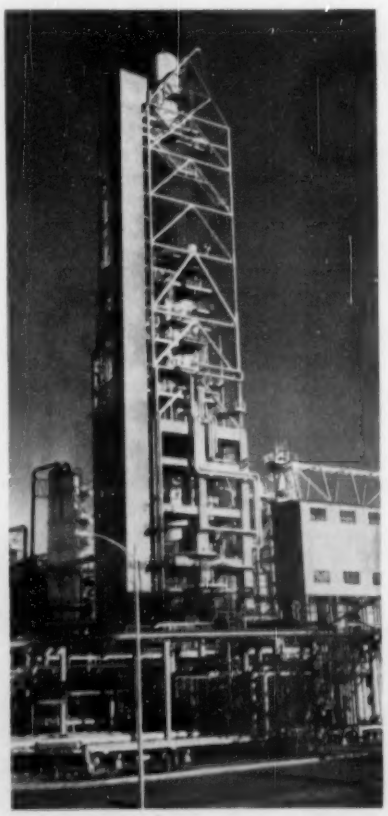
SIMPLIFIED PROCESS DIAGRAM of the new General Petroleum plant and approximate product yields from a 35,000-bbl. crude charge.

Boiler plant . . . Steam-generating facilities, of the semioutdoor type, consist of two boilers designed to deliver steam to the main header at 450 psig. and 550° F. They are rated continuously for 70,000 lb. per hour and have a 2-hour peak rating of 90,000 lb. per hour. They are fired with fuel oil or gas.

In addition to the high-pressure circuit, dry and saturated exhaust steam is available at 150 psig. Exhaust 40-psig. steam from this intermediate is returned to the boiler house. There it is used for feed-water heating. This condensate and that from tank heating and reboilers is returned to a 30,000 gal. storage tank.

Makeup water used is filtered raw water which has been further treated. This consists of treatment to remove solids, filtration to eliminate any sludge carryover, and then treatment in a hot zeolite softener. The final water is characterized by its very low hardness and low silica, oxygen, and CO_2 contents.

Water supplies . . . All plant water is received through a 16-in., 5-mile line from the Nooksack River, where pumping equipment consists of one 1,400-g.p.m. motor-driven pump and an 1,800-g.p.m. standby unit. Water is discharged from the line into an 1,800-g.p.m. high-capacity precipitator where it is treated with alum and lime. Effluent is discharged into a 25,000-gal. fresh-water storage tank. Water to be used for drinking is further treated with hyperchlorite solution and filtered. That for boiler water makeup is further treated as discussed earlier.



THE NEW T-100 TYPE cat cracker, first of its model completed, handles about 15,600 bbl. of fresh feed daily.

. . . Cooling water for the induced-draft cooling tower is circulated by three 12,000-g.p.m. vertical centrifugal sump pumps. The two motor-driven units deliver 24,000 g.p.m. at 66 psig. The standby unit is steam-turbine driven.

. . . Fire-fighting water is stored in the 25,000-bbl. tank, which amounts to a 3-hour supply. Pressure throughout the extensive distribution system is maintained by a turbine-driven centrifugal pump rated at 50 g.p.m. and 175 psig. During any emergency two pressure-controlled turbine-driven pumps of 3,500-g.p.m. capacity supply water at this pressure.

If the supply of fresh water is inadequate, salt water from the sound can be used. Four deep-well pumps located at the base of the pier, driven by 210-hp. diesel engines, can supply 7,000 g.p.m. at a 165-psig. discharge pressure. These feed into the fresh-water high-pressure system, with the two fresh-water pumps acting as boosters to maintain 175-psig. pressure in the system.

Because of the refinery's remoteness from outside fire-fighting equipment, all possible precautions were taken for

quick suppression of any fire which might break out. All towers in the process area are covered by spray systems from master headers. Automatic sprays are installed in the L.P.G. loading-rack area and at other critical points. In order to increase fire resistance, all towers, vessels, and hot lines are clad with corrugated aluminum.

Service facilities . . . Power supplies for the plant are all purchased. Main supply and primary distribution of the 60-cycle three-phase current is at 13,200 volts. Secondary systems then distribute 2,400 and 480-volt power.

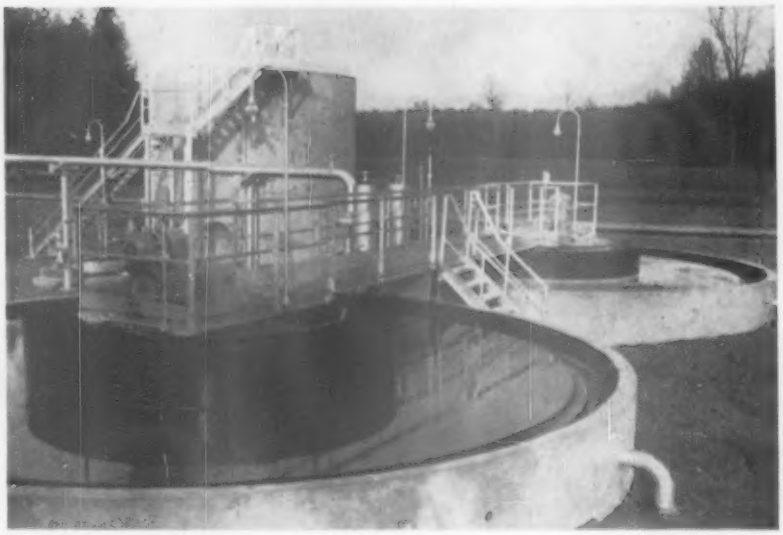
Dual fuel burners are employed in most of the heaters, with gas being the primary fuel.

Storage . . . In laying out the refinery, advantage was taken of the seaward slope of the terrain. The crude storage area was placed at the highest elevation. Received either via the Trans Mountain 24 and 16-in. spur line or through a 20-in. line from tankers anchored at the pier, crude is stored in five 134,000-bbl. floating-roof tanks.

Finished products are stored in 14 tanks having a total capacity of 780,000 bbl. Because of the integrated nature of the refinery, it was possible to hold intermediate storage to only 160,000 bbl. Pressure storage includes a 6,000-bbl. natural gasoline sphere and four 1,100-bbl. tanks for L.P.G. storage.

A 6-ft. dike completely encircles the crude-storage area. Inside this, 4-ft. diversion walls were erected rather than individual dikes for each tank. In erecting the walls advantage was taken of natural terrain slope to create drainage into a common sump about ¼ mile away.

As the plant site is not on a railroad, all supplies were either trucked or moved in by barge. The large towers, fabricated in the Northwest at shops of Willamette Iron & Steel Co. and American Pipe & Construction Co., Portland, Ore., were brought in by the water route.



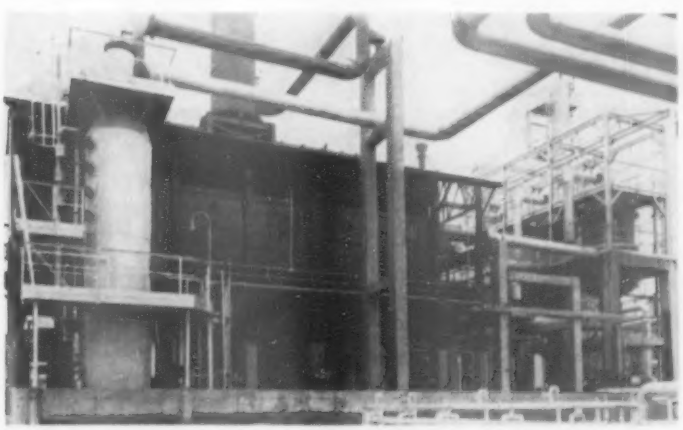
CLEAN EFFLUENT, freed of its phenolic content, overflows from the sludge digesters to the sound.

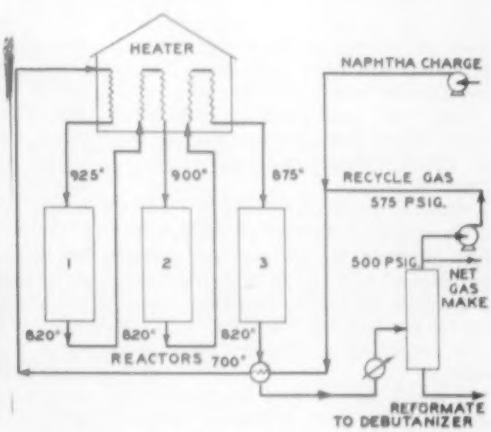
Wharf facilities . . . As the refinery is not located on a railroad, distribution of petroleum products is by tanker barge and tank truck. Facilities are provided for accommodating two tankers of the T-2 type. In addition, there are accommodations for handling one superbarge or two smaller barges.

All loading is by gravity flow. The six lines provided are: Two 20-in. lines for premium and regular gasoline, each capable of handling 11,000 bbl. per hour; 16-in. lines for stove, diesel, and distillate fuel oil, each 6,500 bbl. per hour; one 20-in. heavy-fuel-oil line capable of handling 8,000 bbl. per hour. In addition, there are two 8-in. lines for loading barges with heavy fuel oil at the rate of 1,430 bbl. per hour.

Crude oil is unloaded by the ship's pumps to a 5,000-bbl. tank near the foot of the wharf. From there it is moved to the refinery site by means of two steam-driven centrifugal pumps.

Truck-loading facilities provide space for two tank trucks and trailers and two L.P.G. trucks and trailers. Lines to the first rack include two for gasoline, and one each for stove, diesel, distillate fuel oil, and heavy fuel oil, all of which are 6-in. Loading lines to the L.P.G. consist of 4-in. lines for propane and butane.





THE 6,000-BBL. SOVAFORMER, heater and reactors of which are shown here, was the first unit of its type to go on stream. A simplified flow diagram of the new Socony-Vacuum process is shown at right.

B. L. Rodzianko, assistant manager; Frank Kirkman, refinery engineer, and V. C. Vance, assistant maintenance superintendent, get together in Rodzianko's office for a conference.

Newcomer Damon Jacobsen is greeted by Refinery Manager Curtis Cortelyou and Refinery Engineer John Lutz. It was necessary to hire only 70 workers locally.

General Petroleum's training program shows

How to Staff a New Refinery in a Hurry

PROVIDING an engineering staff, trained operating crews, and maintenance personnel for General Petroleum Corp.'s Ferndale, Wash., refinery turned out to be a much smaller problem than was anticipated.

A program designed to accomplish this end was just getting under way when parent company Socony-Vacuum Oil Co., Inc., decided to close its Olean, N. Y., refinery. Of the 346 people employed at the East Coast plant, 130 now are residing in Ferndale and Bellingham in the "Evergreen Empire."

Ordinarily when a refinery of this size is placed on stream, extensive classroom and on-the-job training programs must be carried out to assure that all personnel will know their jobs. This is particularly true when the refinery is remote from other plants, as is the case here. There just isn't any pool of experienced refinery workers to draw from.

General Petroleum was prepared to carry on such a training and indoctrination program, but the problem turned out largely to be one of matching available skills with jobs available. Some on-the-job training was required, but little detailed class-room instruction was needed.

About a year before the plant was scheduled to open, Curtis Cortelyou, who had been selected as manager, was provided with his technical staff. This consisted of a chief engineer, four process engineers, two design engineers, maintenance superintendent, operating superintendent, chief refinery accountant, and laboratory foreman. All were then employed at the company's 125,000-bbl. refinery, near Los Angeles. The new jobs to which they were shifted, either at the refinery site or in the Los Angeles main offices, represented an advancement in all cases.

During succeeding months, remainder of the cadre of 65 were chosen. These included assistant superintendents, shift foremen, maintenance foremen, and other operating personnel. In each case the new jobs represented a step upward. All had been picked by about January a year ago. They continued working at Torrance, but at their new jobs under the guidance of their direct supervisors.

This was the status last May when Socony-Vacuum decided to close Olean. Instead of having to hire and train some 250 workers in the Washington area as had been planned, General Petroleum soon found that of the 346 workers employed at Olean, 145 desired to move west (15 later changed their minds).

How the Olean group picked four couples to visit Ferndale and study job, living, housing, and other conditions was given national publicity. Those who decided to make the move were transferred at expense of the company.

Thus last fall when various units of the Ferndale refinery started coming on stream, the company found it needed to hire only 70 workers locally. An additional 65 maintenance workers will not be hired until next summer.

Much of the necessity for training had been removed, but some still was necessary. Olean had been only a grease and specialty oil plant where coal had been the primary fuel. Thus while all Olean transferees were experienced refinery workers, many were shifted to new duties. In addition to this phase of training, the entire refinery complement was thoroughly schooled in first aid, safety, and fire protection.

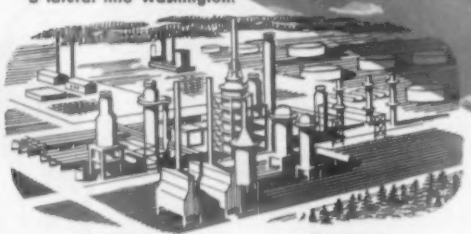
No small part of the operating personnel's training occurred at the time Bechtel Corp. turned each unit over to General Petroleum. Operators accompanied the contractor's personnel as they traced piping and conduits, checked pumps and motors, and otherwise assured all was in readiness to be placed in operation. In this manner the operators quickly became acquainted with details of the units they soon would be operating.

All the planning and training proved worthwhile. While minor hitches occurred in the startup, the entire plant came to life without serious accident or injury.

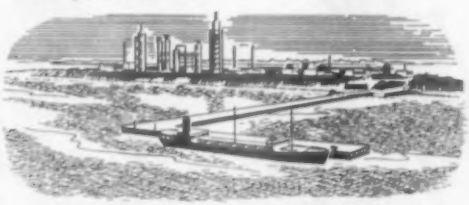
THE AGE OF OIL IN THE PACIFIC NORTHWEST

COMPLETE AND IN OPERATION:

...the 718-mile Trans Mountain Oil Pipe Line from Alberta producing area in British Columbia, and a lateral into Washington.



...the 25,000 barrels-per-day Ioco (B.C.) Refinery of Imperial Oil Limited.



...the 35,000 barrels-per-day Ferndale Mobilgas Refinery of General Petroleum Corporation.

IN DESIGN AND CONSTRUCTION:

...Shell Oil Company's Anacortes Refinery of 50,000 barrels-per-day capacity.

Pipe Line and Refineries Contribute to Growth

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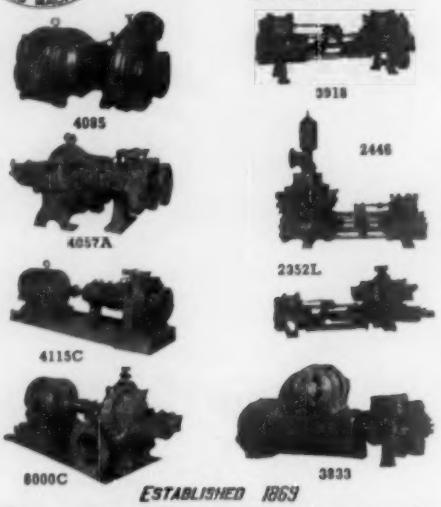

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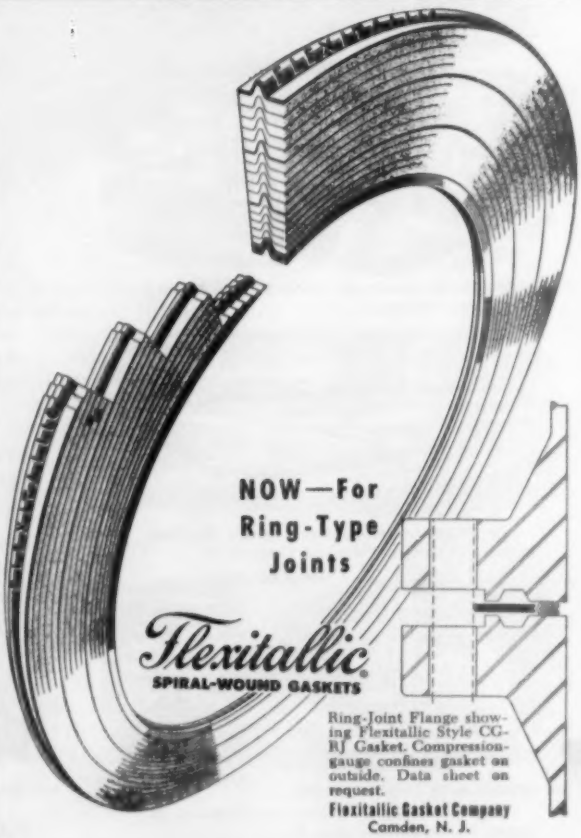

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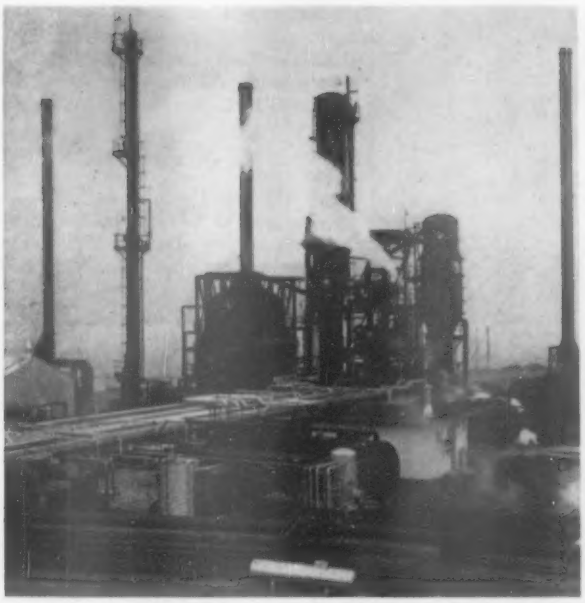


TWO-STAGE crude-distillation unit with vacuum tower and heater at right.

FLUID CATALYTIC cracking unit, Model IV type, and, at right, the cat poly unit.

Standard refinery operates on Canadian crude

British Columbia Plant Now on Stream

THE 11,000-bbl. refinery Standard Oil Co. of British Columbia recently placed in operation at North Burnaby is thoroughly modern, highly integrated, and designed for maximum yields of high-octane motor fuels and light burning oils.

Constructed at a cost of about $10,000,000, it is comprised of the 11,000-bbl. (per operating day) two-stage crude-distillation unit, 3,750-bbl. catalytic cracking unit, gas-recovery facilities, and 900-bbl. catalytic polymerization unit.

Operating on Alberta crudes of about 34° to 40° gravity, these units combine to yield about 45 per cent of light and heavy straightrun gasolines, light and heavy catalytic cracked gasolines, and motor polymer gasoline. Additional products are propane, butane, stove and diesel oil, cracked gas oil, and heavy fuel oil or asphalt.

The plant was constructed on a 75-acre site about 1 mile east of the original 7,500-bbl. Stanovan refinery, constructed on Burrard Inlet in 1935. Blending, storage, and shipping facilities of the original plant are being utilized but all process equipment has been shut down.

Actual work on the plant began in late March of last year. In October it was accepted by Standard of B. C. and placed in operation. The catalytic cracking unit, fractionation, gas-recovery, and caustic-treating sections were designed and constructed by Fluor Corp. of Canada, Ltd. The engineering department of parent company Standard Oil Co. of California provided field representation and designed the crude unit, polymerization plant, boiler plant, and all associated off-plot facilities. Purchase and fabrication of the majority of equipment and machinery were done within the greater Vancouver area.

Process highlights . . . Alberta crudes from Trans Mountain Oil Pipe Line Co. Burnaby tank farm are moved to the refinery site via a 12-in., 5-mile feeder line. The crude is chemically desalted midway in the heat exchange of the crude unit. Bottoms from the atmospheric column, after being heated in a gas-fired vacuum furnace, are charged to the vacuum tower. From there some 3,750 bbl. daily of feed stock for the Model IV fluid catalytic cracker is removed overhead and charged directly to the reactor in the catalytic cracking unit.

Light and heavy straightrun gasolines from the crude unit are sweetened by copper chloride treating prior to being pumped to the original refinery site for storage. Light and heavy catalytic cracked gasolines are caustic treated to remove undesirable sulfur compounds prior to being pumped to storage.

The polymerization plant is a California Research Corp. phosphoric acid-on-quartz type unit. Light olefins from the gas-recovery section are caustic treated and fed to reactors containing the phosphoric acid on a bed of quartz. The reaction mix is exchanged with incoming olefin feed and then charged to a stabilizer and depropanizer for

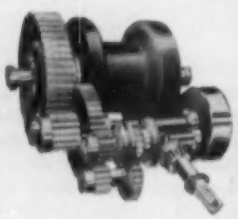
Rigs weighing up to 225 tons moved up to 8 miles

. . . thanks to pulling power of CARCO winch!

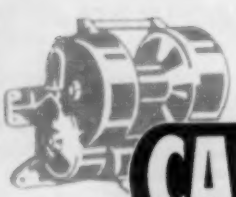
Without disassembling, rigs are moved from one location to another in the Tioga oil field in North Dakota. A Model J Carco winch on an International TD 24 is used by the Mendenhall Construction Company to do the pulling. Towing rigs weighing from 150 to 225 tons from two to eight miles is a real test of a winch innards. Hills, mud, sand, snow and frozen ground present problems. If the tractor loses traction, the operator releases winch brake and, paying out line, moves ahead to firm footing. He then winches the rig up to the tractor. The efficient doubling of tractor pulling power does the job.

Mr. Mendenhall states that Carco winches are more compact and better constructed. In over 2000 hours of rough, tough work, maintenance expense has been zero.

You can expect greater value from the leading producer, and get it from Carco, first in winch production. PACIFIC CAR AND FOUNDRY COMPANY, Renton, Washington. Branches at Portland, Ore., and Franklin Park, Ill.



Doubling the pulling power of the most powerful crawler tractors calls for a gear train that's tough and rugged. The Carco Model J winch converts tractor power into line pull efficiently and directly through a 4-stage constant mesh gear train. The doubled line pull is made possible by a high ratio of gear reduction. As faster line speed is generally desired for paying out the line, a lower gear ratio is provided in reverse. Heavy-duty gears and shafts of heat-treated special alloy steel guarantee a large overload capacity. Precision cut, gears and shafts, with anti-friction bearings, operate in a continuous oil bath.



WINCHES
FOR ALL
INDUSTRIAL
TRACTORS

CARCO®

production of propane, butane, and motor polymer gasoline.

An interesting feature of the gas-recovery section is the use of hydraulic couplings on the three motor-driven reciprocating gas compressors. In these couplings, sets of twin disks rotate in sealed reservoirs of oil, replacing the usual mechanical linkage. This was done to smooth out pulsations, to absorb torque reversals which would otherwise be present if mechanical linkage type couplings were used.

Auxiliary facilities . . . The refinery is essentially all electrified. Steam drives are provided only for steam balance and are generally employed on critical services such as feed and bottoms pumps.

Power is fed to the site by two separate 12,000-volt feeders from British Columbia Electric Railway Co. Twin transformers and distribution buses are provided in parallel with automatic throwover switches so the entire refinery electrical load can be placed on either feeder if the other feeder suffers a power outage.

The main electrical switchgear and 2,300-volt starters are housed in a unit-type substation, while 480-volt starters are located at the individual plants. An emergency generator is provided in the catalytic cracking unit to handle critical lighting and emergency loads in case a complete power failure does occur.

Related facilities include a 60,000-lb. per hour boiler plant and a four-cell induced-draft cooling tower. Cooling water, at a rate of about 6,800 g.p.m., is circulated through the plant. Makeup water is supplied through a line connected to the Burnaby municipality water system. Excess process gas is used as refinery fuel, for heat, economy, and to avoid flaring to the atmosphere.

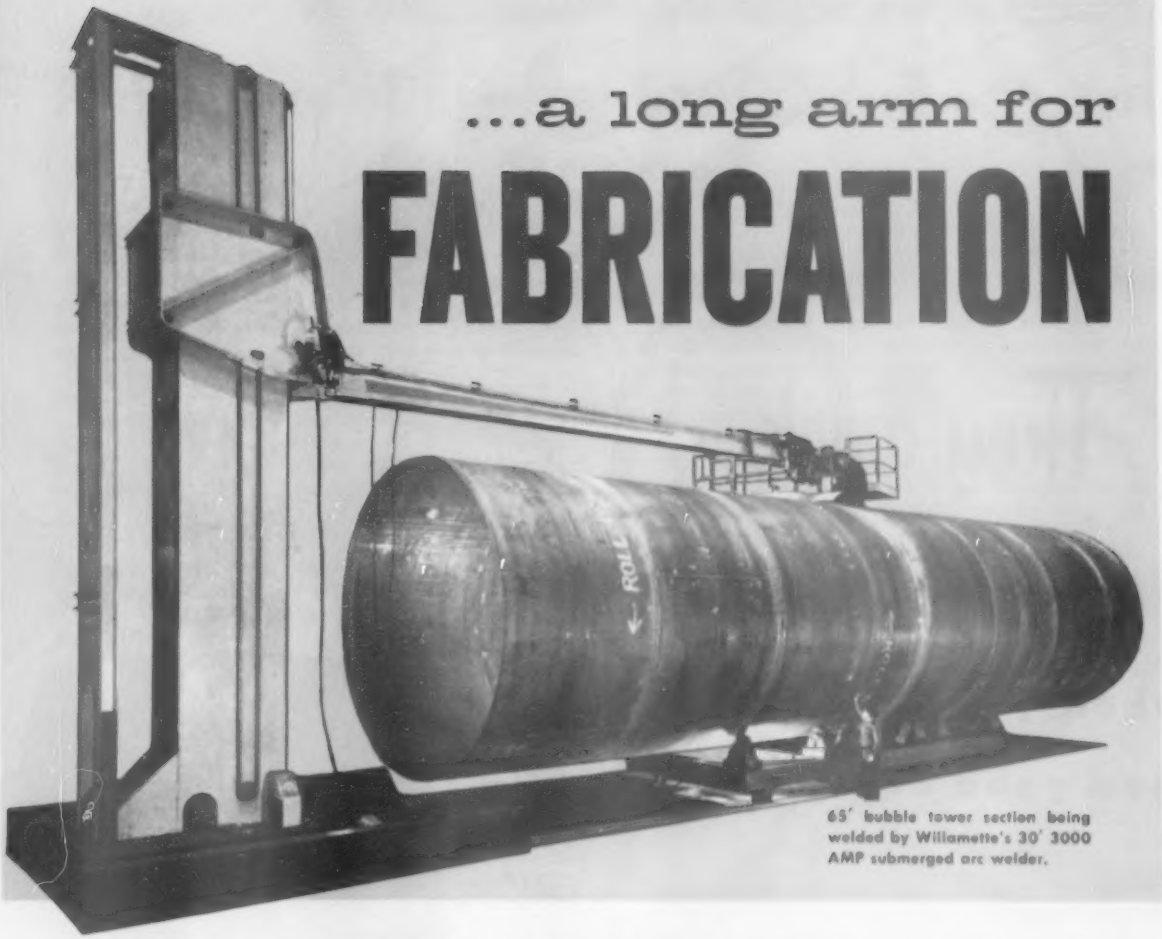
With respect to flaring, a distinguishing feature of the plant is a 30-in.-diameter, 300-ft. guyed stack for venting flue gases from the cat cracker. The unusually tall stack was used so that escaping gases will be released at a level high enough for maximum dispersion, and to be doubly sure they will be of no annoyance to nearby residents. Erection of the two stack sections was accomplished using a 150-ft. gin pole.

To keep catalyst fines discharged to the atmosphere at a minimum, an electrical precipitator is used. The flue gas first is passed through a 400-lb. steam generator upstream from the precipitator.

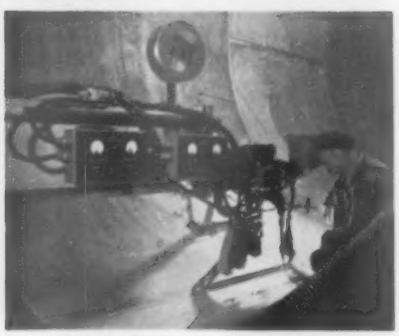
In keeping with modern design, all piping and conduits are placed on overhead pipe racks. Also in keeping with the modern trend, despite the relatively far-north location of the plant, all pumping equipment is placed in the open.

...a long arm for

FABRICATION



65' bubble tower section being welded by Willamette's 30' 3000 AMP submerged arc welder.



Close-up showing details of 3000 AMP submerged arc welder built by Willamette to serve their customers.

Solving BIG problems with money and time-saving ideas is regular routine at Willamette Iron and Steel Company. This same kind of problem-solving by the best in experienced personnel—mechanical and structural designers—is ready to serve private industry, the heavy construction field and the Federal, State and Municipal Governments.

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Performance of External Gas Drive—2

by Dr. R. F. Nielsen

IN the previous discussion, solution of injected gas in the oil was considered negligible. If part of the injected gas goes into solution, volumetric rate of displacement at the oil bank is slower than near injection wells. If it is assumed that solution only takes place at the front, as unsaturated oil is contacted, then movement of any saturation behind the front is governed by injection rate.

This rate is q (reservoir conditions) in Equations 2 and 3 of previous installment. As before, reservoir pressure is assumed constant. At breakthrough, total reservoir cubic feet injected is:

$$PV\,[S_{av} + (1 - S_w - S_{av})\,\Delta s\alpha/\beta]$$

where Δs is injected gas dissolved, standard cubic feet per stock tank cubic feet of oil, and S_w is water saturation. This is also equal to $PV/(dF/dS)$, so:

$$S_{av} + (1 - S_w - S_{av})\,\alpha\Delta s/\beta = 1/F' \qquad (8)$$

where F' is the slope of the tangent to the F curve from the point $F = 1$, $S = S_{av}$. S_{av} may be found by trial and error from a plot of F against S so that Equation 8 is satisfied. This equation is the same as given by Kern, if $S^* + (1 - F)/F'$ is substituted for S_{av}, S^* being saturation just behind the bank.

Saturations governing producing gas-oil ratios are considered to be those near enough to the wells so that the reservoir volumes between these points and the wells are small compared to total volume drained by the wells. But they are far enough so that the pressure will not be too much below the mean. Largest part of the pressure drop is of course near the sand face.

The theory discussed so far has been for the case in which there is a bank of oil ahead of the injected gas. If initial gas saturation is high, the oil will not form a bank and the gas phase will be continuous from input to producing wells. This is often true if the field has been previously depleted by a primary dissolved-gas drive. That there is a minimum gas saturation necessary for formation of a bank may be shown on the figure. If, for instance, saturation before the drive is uniform and less than the intercept on $F = 1$ of the steepest tangent that can be drawn to the curve, a bank would not be expected to form.

If there is no oil bank, production behavior and change of saturation distributions with time do not follow the Buckley-Leverett theory as developed for the case in which there is a bank.

One approach to the problem might be to assume that, for a time, reservoir gas-oil ratio will be given by the viscosities and relative permeabilities corresponding to average initial saturation. Near the injection well a region of variable saturation will be set up in which saturation varies from the initial saturation S_i to S (max) (Fig. 1). This region will increase in extent with time.

Author is associate professor of petroleum and natural-gas engineering, Pennsylvania State University.

If, as before, pressure is assumed constant, any saturation S between S_i and S (max) will be volumetrically displaced through a pore volume $Q\,(dF/dS)_S$, if Q is the amount of gas injected.

Thus the amount of gas (at reservoir conditions) injected before the region of variable saturation hits the producing wells is PV/F_i', where F_i' is slope of the F curve at initial saturation (Fig. 2) and PV is pore volume corrected by a sweep factor. Average saturation in the swept area at this time is given by the intercept S_{2av} of the tangent to F at S_i on the $F = 1$ line. Performance after the region of variable saturation has reached the producing wells is as discussed in the previous section.

Before the region of variable saturation reaches the producing wells, gas-oil ratio at reservoir conditions is constant at $F_i/(1 - F_i)$ according to the suppositions made, if there is no water production and no complications due to capillarity effects. During this time, total gas injected is, from above, PV/F_i'. F_i', the slope at F_i, is equal to $(1 - F_i)/(S_{2av} - S_i)$ by geometry.

Gas produced (reservoir conditions) in the period just mentioned is the gas injected minus the oil displaced $PV\,(S_{2av} - S_i)$, or:

$$\Delta G = PV\,[(S_{2av} - S_i)/(1 - F_i) - (S_{2av} - S_i)]$$

$$= PV\,F_i\,(S_{2av} - S_i)/(1 - F_i) \qquad (9)$$

Reservoir oil produced is ΔG divided by the gas-oil ratio $F_i/(1 - F_i)$, or $PV\,(S_{2av} - S_i)$, which is the result expected by simple material balance.

Theories presented in this discussion are rather idealized, but they should prove useful in analyses and correlations of field data from external gas-drive properties.

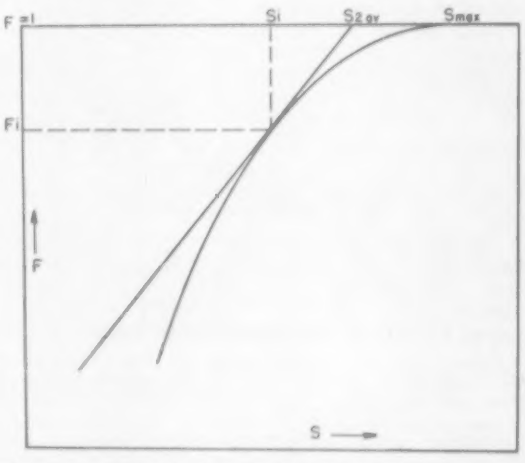

Fig. 1—Use of a plot of fractional gas flow against gas saturation when there is no oil bank ahead of the injected gas.

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ELECTRIC LOGGING—52

Avoiding Interference by Gamma Rays

by R. I. Martin

TWO disturbing factors on the neutron-gamma log are the gamma rays from the source material and the natural gamma rays from the formation.

Gamma rays from source . . . Neutron logs may be adversely affected by gamma rays coming directly from the source material. Although a shield may be used inside the instrument, these gamma rays pass through the annular space. When this is large, as in caved sections of the hole, the effect of these gamma rays is large and may be recognized. In less extreme cases, they may not be recognized, and may cause errors in interpretation.

The undesired effects may be reduced or eliminated in three ways:

1. By use of a gamma-ray-free source.
2. By use of improved shields.
3. By use of a detector which is not sensitive to gamma rays.

Most of the neutron logs taken before the end of 1950 were adversely affected by gamma rays from source.

From the formation . . . Since the gamma rays of capture are stronger than naturally occurring gamma rays, a detector can be used which is only one-sixteenth as sensitive as those used in gamma-ray logging. In most cases therefore, the effect of natural gamma rays on a neutron gamma log may be neglected.

Author is assistant professor of petroleum engineering, Missouri School of Mines and Metallurgy.

Neutron-neutron log . . . Since the neutron-neutron log records neutron intensity, it is not affected by gamma rays and hence is not affected by the last two features discussed.

Fig. 1 shows both gamma-ray and neutron logs of a limestone between two shales. Low values on the neutron curve are interpreted either as indicating fluid-filled pore space in the limestone, or as confirming the gamma-ray indication of shale.

Work has been done by Bush and Mardock[1] which shows that under favorable conditions it is possible to establish a relationship between the deflection on the neutron curve and porosity.

Although gamma rays will penetrate casing in the well, their intensity is reduced thereby. As a result, if a log is run in a cased hole, an offset in the log will occur where a change in the number of strings of casing is encountered.

Because the gamma rays of capture are less strong from hydrogen, a decrease in the values shown on the neutron-gamma log will take place below the fluid level in a well.

Reference

1. Bush, R. E., and Mardock, E. S., "Some Preliminary Investigations of Quantitative Interpretations of Radioactivity Logs," Petroleum Technology, Vol. 2, No. 1, T.P. 2780.

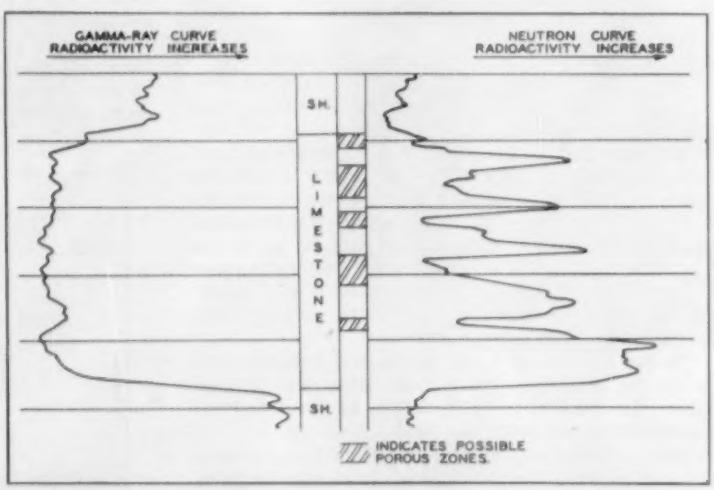
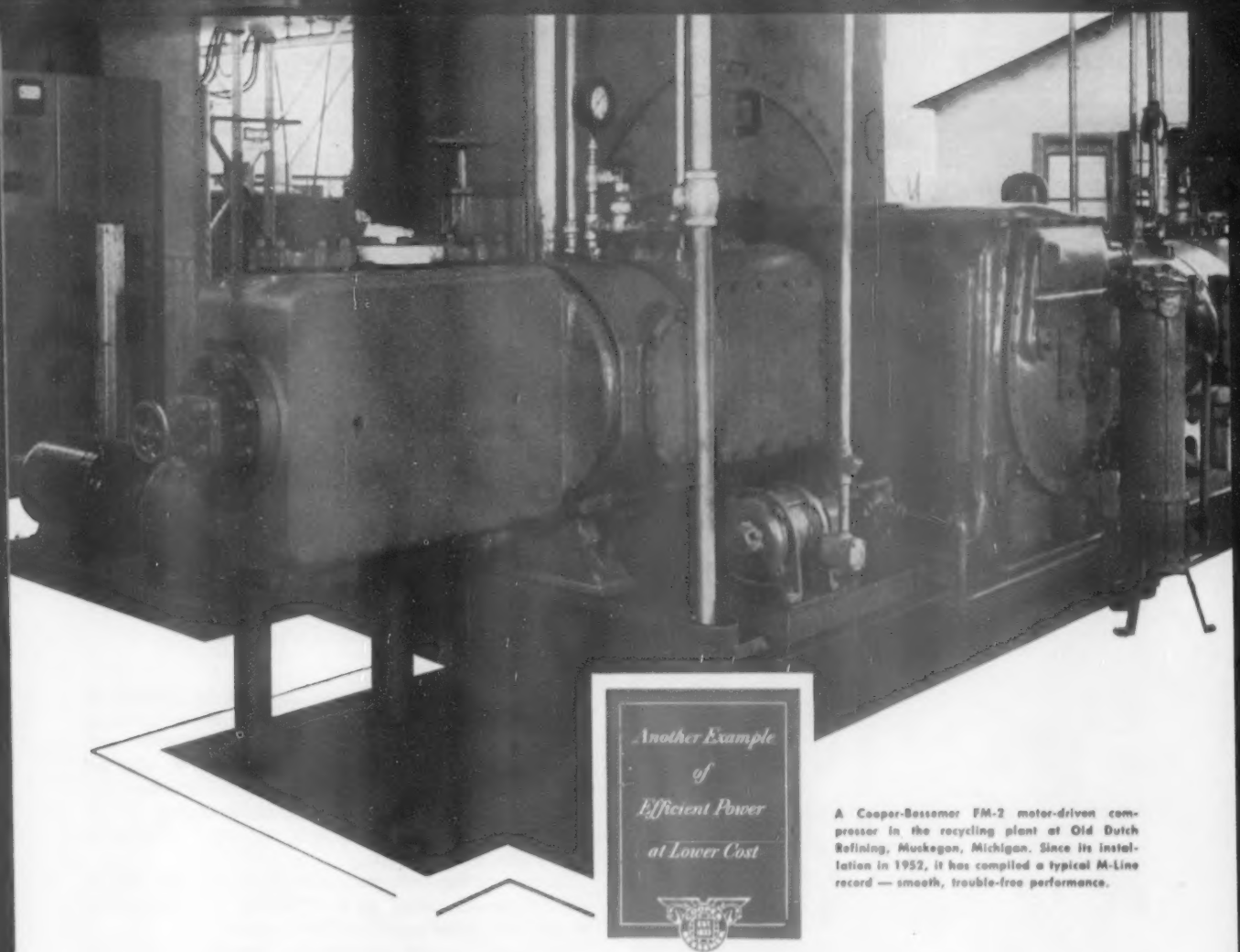


Fig. 1—Low values on the neutron curve are interpreted as indicating fluid filled pore space in the lime, or as confirming the gamma-ray indication of shale. (Courtesy Lane-Wells Co. Bulletin RA-47-B-2).



A Cooper-Bessemer FM-2 motor-driven compressor in the recycling plant at Old Dutch Refining, Muskegon, Michigan. Since its installation in 1952, it has compiled a typical M-Line record — smooth, trouble-free performance.

How UNATTENDED COOPER-BESSEMER RECYCLES HYDROGEN at Old Dutch Refining

RELIABLE, unattended performance has proved to be a top money-saving feature of a Cooper-Bessemer M-Line compressor operating in Old Dutch Refining Company's modern Muskegon, Michigan, plant, leased by Aurora Gasoline Company.

Every day, more than seventeen million cubic feet of hydrogen are recycled by a 2-cylinder single stage Cooper-Bessemer FM-2 used in the UOP Platforming process for upgrading naphthas. Because of automatic controls, this unique compressor runs continuously without the need of operating personnel.

This Cooper-Bessemer unit receives the hydrogen from the reactors and compresses it for recycling to the naphtha heaters.

Continued precision output of the recycling compressor is vital to the successful completion of the entire Platforming process. That is why efficient, compact, Cooper-Bessemer M-Line compressors were chosen for the job.

If your requirements call for either motor or engine driven compressors, get the complete details on Cooper-Bessemers. They are available in sizes from 100 to 5000 horsepower.

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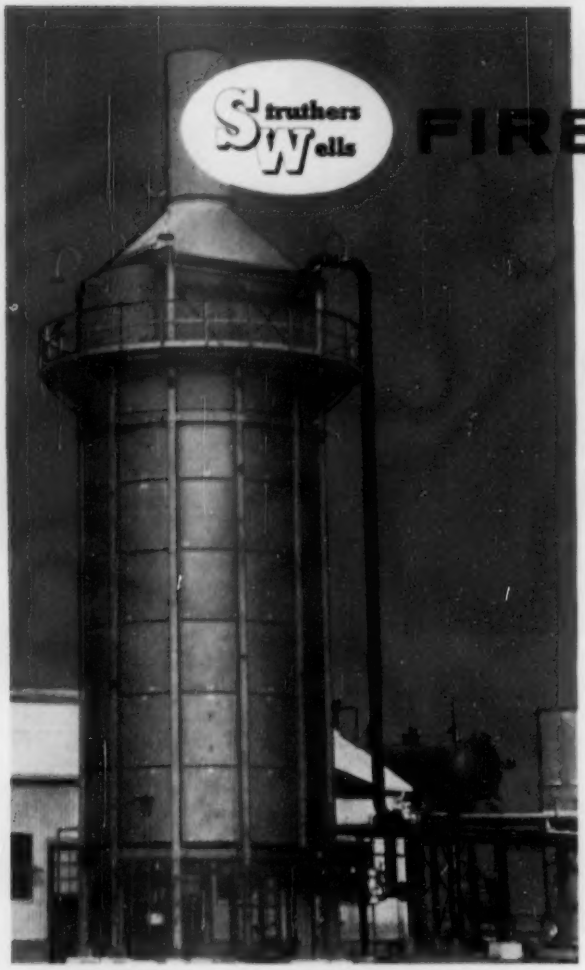

A Struthers Wells Type CV absorption oil heater installed at a gasoline plant of one of the largest gas transmission companies, the third installation for this company.

FIRED HEATERS

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GASOLINE PLANTS

CHEMICAL PLANTS

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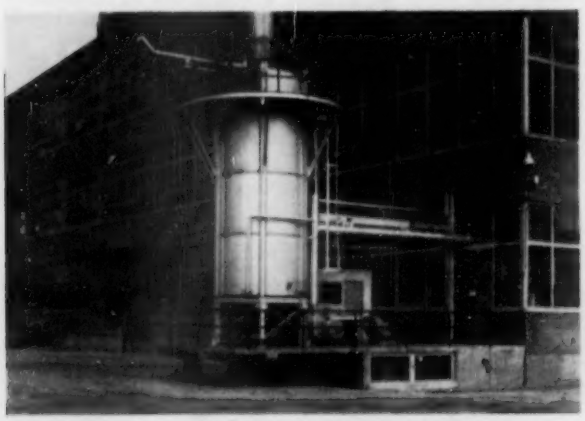
Available in standard sizes from 500,000 to 40,000,000 BTU per hour

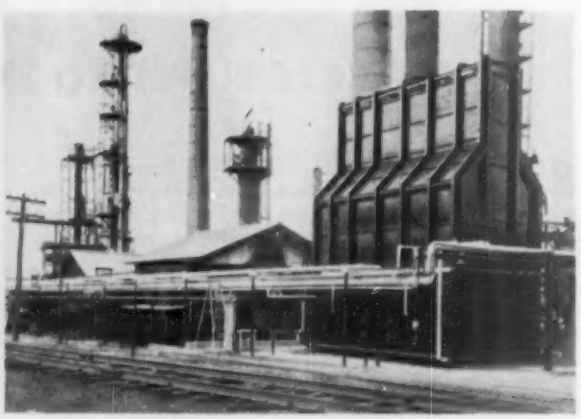
Hundreds of Struthers Wells fired heaters are now in service, in a wide range of sizes, for direct heating of petroleum oil, hydrocarbon gases, asphalt, air, oxygen, hydrogen and superheating steam, and for indirect heating using circulating heat transfer mediums. Circulating fluids used include molten metal, molten salt, Dowtherm, mineral oil, and a number of other organic materials.

In connection with heating systems, we can supply all equipment items, as a complete unit, including wired and piped panel control boards.

We also supply electrically heated units—and special heating and cooling equipment, including water heaters.



A fired heater for Struthers Wells Dowtherm heating system, one of two units installed in a new chemical plant for the production of vat dyes.



Shown above are two Struthers Wells heaters in petroleum refinery service. At right is a three-coil heater used in catalytic reforming of gasoline. At left is a heater which was installed over 23 years ago, and is still in continuous service.

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WARREN, PA.

PLANTS AT WARREN, PA. AND TITUSVILLE, PA.

Offices in Principal Cities

Struthers Wells

by W. L. Nelson
Technical Editor

QUESTIONS ON TECHNOLOGY

Wax Content of Crude Oils—Miscellaneous

NOTE: Table 1 on this page is a continuation of the question of G.M.P. which appeared last week. Tables of the wax content of United States and Venezuelan crude oils were introduced on this page last week.

Crude oils that contain the largest amounts of wax are those from Burma (8-16 per cent), Assam (10.7 per cent), Romania (up to 10 per cent), Venezuela (up to 21 per cent) and a few of the mixed base crude oils of the United States (up to 8 per cent).

Table 1—Wax Content of Miscellaneous World Crude Oils*

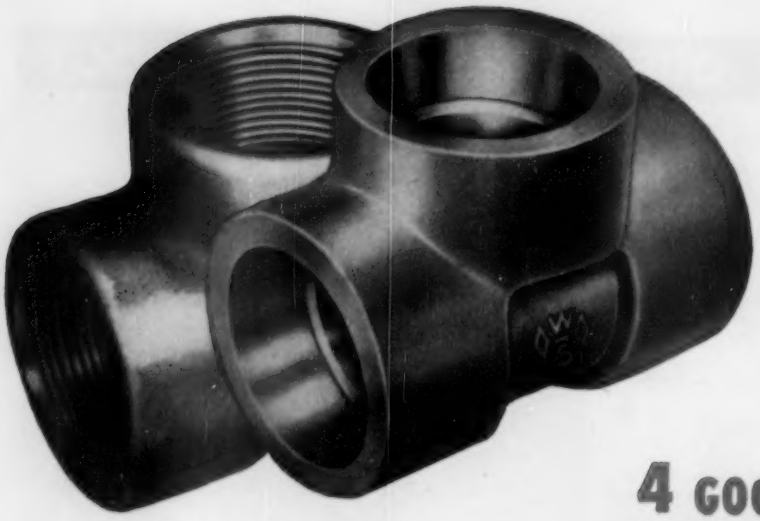
Crude oil—	°A.P.I.	Wax: Per cent	Wax: Kind
Argentina:			
Plaza Huincul	35.8	2.9	(A)
Assam†	33.8	†10.7	(A)
Austria:			
Gosting	18.6	0.2	(C)
Baumgarten	26.0	2.82	(C)
Urmansau	25.8	1.26	(C)
Bahrain‡	32.9	‡2.0	(A)
Burma	36.6-38.0	14.8-16.0	(C)
Burma†	38.0	†8.0	(C)
Czechoslovakia:			
Bohuslavice	49.1	2.3	(C)
Egbell	19.8	zero	(C)
Hodonin	18.7	zero	(C)
Mikovd	46.3	3.6	(C)
Turzovka	36.7	7.9	(C)
Egypt:			
Gemsah	39.6	4.94	(C)
Hurghada	21.5-24.5	†7.0-8.0	(C)
Iran:†			
Maidan-i-Naftum	37.6	4.5	(C)
Iraq:			
Kirkuk	36.2	1.95	(A)
Mexico:			
Alamo	32.1	1.7	(A)
Altamira	12.01	0.35	(A)
Belem	47.16	2.00	(A)
Cacalilao	12.01	0.28	(A)
Cerro Viejo	22.6	3.32	(A)
Corcovado	11.7	0.25	(A)
El Plan (waxy)	32.3	2.80	(A)
El Plan	23.0	0.57	(A)
Filisola	21.6	0.74	(A)
Furbero	26.9	2.30	(A)
Juan Casiano	20.8	2.20	(A)
Los Naranjos	21.1	3.87	(A)
Mecatepec	25.4	2.49	(A)
Panuco	11.7	0.58	(A)
Potrero	21.1	4.10	(A)
Poza Rica	30.6	3.88	(A)
Salinas	12.4	0.82	(A)
San Diego	17.9	3.16	(A)
San Pedro	49.2	3.40	(A)
Sarlat	39.2	0.30	(A)
Tanhuijo	15.6	0.77	(A)
Teapa	40.6	2.0	(A)
Tecuanapa	32.1	1.20	(A)
Tierra Amarilla	22.0	2.65	(A)
Tonala	27.1	0.77	(A)
Tonala (waxy)	29.1	2.20	(A)
Topila	14.5	0.60	(A)
Zacamixtle	20.5	2.26	(A)
Romania:			
Arbanari	39.0-41.0	6.0-6.5	(C)
Bustenari	33.0-39.0	under 1.0	(C)
Campina	29.3-39.0	0-5.0	(C)
Carpeni	39.0-47.6	4.0-5.0	(C)
Ceptura	31.1-35.0	4.5-8.0	(C)
Cervenia	39.0-43.2	6.0-6.5	(C)
Filipesti	29.3-35.0	6.0-6.5	(C)
Mionesti	29.3-35.0	5.0-5.7	(C)
Moreni	35.0-45.4	3.0-6.5	(C)
Ochiuri	24.0-33.0	zero	(C)
Ochiuri	33.0-39.0	2.0-10.0	(C)
Solont-Stanesti	33.0-41.0	3.0-5.0	(C)
Tintea	24.0-39.0	3-2.0	(C)
Zemes	29.3-31.1	4.0-6.0	(C)
Russia:			
Balakhany, light	27.8-32.3	0.8	(D)
Balakhany, heavy	20.7-24.0	0.4	(D)
Bibi-Eibat, light	29.7-35.6	0.4-0.8	(D)
Bibi-Eibat, heavy	25.7-26.2	0.8	(D)
Binagady	21.2-24.6	0.3	(D)
Chusov	16.8	1.2	(D)
Dossor, 2nd layer	26.3-29.7	0.12-0.13	(D)
Dossor, 3rd layer	25.9-32.7	0.13-0.26	(D)
Grosny	29.3-35.6	0.1-0.74	(D)
Grosny (waxy)	34.9-37.4	3.46-4.77	(D)
Kala	29.1-30.8	1.3-1.8	(D)
Kara-Chukkur	34.8-35.5	3.6-5.6	(D)
Kim	33.6	2.5	(D)
Koschagil	32.3-33.6	0.73-1.18	(D)
Lok-Batan, light	31.7-33.6	0.4-0.7	(D)
Lok-Batan, heavy	31.1-24.4	0.55-0.9	(D)
Maikop	38.9	0.5	(D)
Makat	25.5-31.3	0.4-0.64	(D)
Malgobek	21.2	1.67	(D)
Nebitdag	27.8	0.53	(D)
Okha, 3rd layer	20.3	0.03	(D)
Okha, 7th layer	22.5	0.69	(D)
Okha, 11-12th layer	31.0	1.13	(D)
Romany	23.6-33.8	0.12-0.20	(D)
Shorsu	30.6	3.0	(D)
South Iskine	43.6	1.75	(D)
Sterlitamak	29.3-31.0	1.38-1.53	(D)
Surakhany, upper	30.6-31.6	2.4	(D)
Surakhany, lower	24.6	0.4	(D)
Ukhta	31.0	2.08	(D)
Voznesensk, light	24.9-25.7	2.03	(D)
Voznesensk, heavy	19.5-22.3	1.15-1.19	(D)
Saudi Arabia:‡			
Abqaiq "C" Zone	27.0	‡1.0	(C)
Abqaiq "D" Zone	27.0	‡1.7-3.1	(C)
Abu Hadriya	35.0	‡3.6	(C)
Damman	35.0	‡2.0-3.8	(C)
Qatif "C" Zone	30.0	‡3.1	(C)
Qatif "D" Zone	36.0	‡2.5	(C)
Syrian, heavy	10.4	1.2	(C)
Syrian, bitumen	3.4	1.4	(C)
Turkey:			
Pulk River	36.7	1.0-2.0	(C)

*Dunstan et al., Science of Petroleum, Vol. II, Oxford Univ. Press, London 1938 except when noted with a (†) or a (‡).

†Sachanen, A. N., The Chemical Constituents of Petroleum, p. 286, Reinhold Publ. Corp., New York, 1945.

‡Dunstan et al., Science of Petroleum, Vol. V, Part I, Oxford Univ. Press, London 1950.

(A) Total wax. (B) Microcrystalline. (C) Paraffin wax. (D) Paraffin with destruction.



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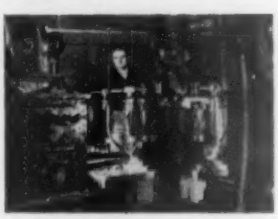

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Roselle, New Jersey

Designing and Applying High-Speed Turbines—4

by H. Steen-Johnsen

THE bucket shank has to be analyzed in detail to obtain maximum load-carrying ability from a certain volume of material, Fig. 1. This photoelastic study shows the result of such analysis.

Offhand, the two pine trees pictured look alike. But a closer look shows that the one on the right-hand side has been cut out a little deeper than the other one, and that some slight amount of weight has been removed from the bucket and added to the disk. The result is that these two pictures both show the same order of stress, but the left-hand one shows this stress with a loading corresponding to 9,600-r.p.m. speed while the modified and improved design shows the same stress with a load corresponding to 12,000-r.p.m. speed.

Accordingly, it is not enough just to consider a pine-tree fastening. For high speed, the designer has to study the fastening carefully and evaluate various types of changes in order to get the maximum results from a certain volume of material. And at these speeds the volume of material in the blade and the fastening is definitely limited.

In addition, to get the maximum from this pine-tree shank, the difference in yield strength between the bucket material and the disk material should be considered. In other words, wherever it is permissible to stress one material higher than the other because its yield point is higher, this difference also should be taken advantage of.

Author is chief engineer, turbine division, Elliott Co., Jeanette, Pa. Paper presented at the petroleum-mechanical engineering conference of the A.S.M.E., held at Los Angeles in September 1954.

Speed and horsepower . . . For a condensing turbine, the exhaust annulus limits the maximum horsepower. This holds regardless of high speed or otherwise. The flow through the last-stage blade is the criterion that we are working from and the tip speed of this blade can be the same regardless of whether the blade runs at 3,600 r.p.m. or at 12,000 r.p.m. Fig. 2.

The 8-ft. diameter has the same tip speed at 3,600 as the 2-ft., 5-in. diameter has at 12,000 r.p.m. Therefore, the blades at these two r.p.m.'s are equally high speed. This approximate capacity line is drawn for a tip speed of 1,500 ft. per second. At 3,600 r.p.m. the horsepower limit with this tip speed is around 55,000 hp. At 12,000 r.p.m. it is around 5,000 hp. The 3,600-r.p.m. last-stage wheel would have an outside diameter of 100 in. Using 25-in.-long blades with a double-flow exhaust, it would develop around 100,000 kw. or more in central-station practice.

As the horsepower is reduced, the diameter of the annulus goes down and the speed can be brought up as indicated by the curve. A 25,000-r.p.m. figure is not impressive unless it also is mentioned that it is a condensing machine with a horsepower which exceeds 1,000.

This curve serves as an illustration only, because the numerical values are affected by many factors such as vacuum used, heat drop and efficiency expected from the last stage, throttle pressure, and steam bled off for feed heating.

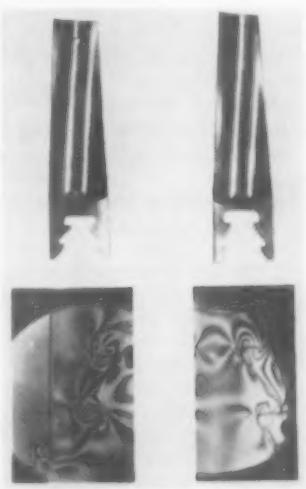


Fig. 1—Comparative stress pattern in pine tree shanks.

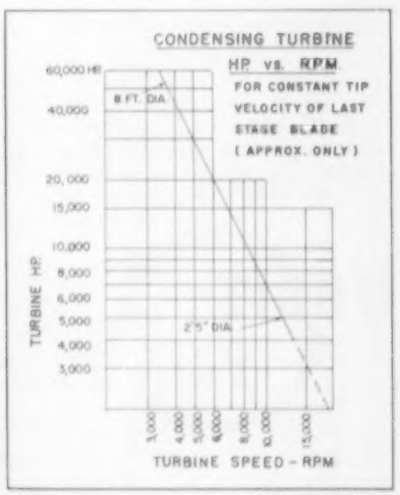
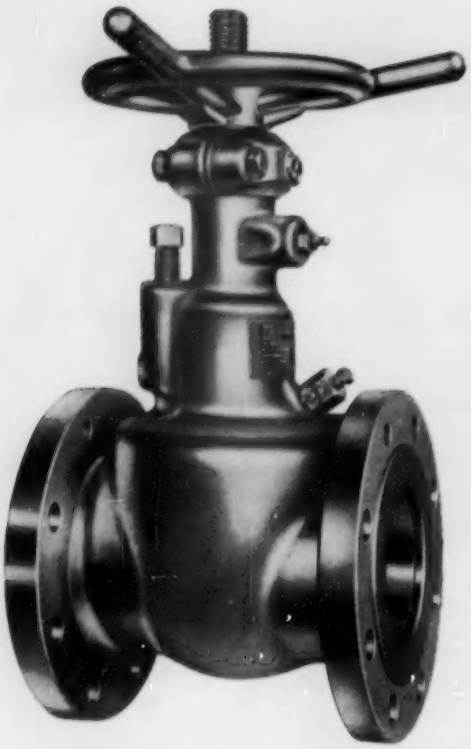


Fig. 2—Plot of capacity as a function of r.p.m. speed for constant tip speed of last stage blade. (Approximate).



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COMPRESSOR MAINTENANCE—2

How Tide Water Handles Valve Maintenance

by H. B. DeBenedetti

EXCEPT for the difficulties experienced in machines handling cat cracker gases, at the Tide Water Avon refinery we have had only routine valve trouble. Valve difficulties in other units were and are confined to occasional disk breakage and normal wear between valve seat and valve plate faces.

When to inspect . . . We have found in most cases that we should inspect the valves in each machine at about 6-month intervals. Time of inspection is coordinated with the operating department to maintain high process unit rates.

An example of this is in our compressors handling propane in a refrigeration cycle. Valve inspection, cleaning, and/or replacements are made when compressor horsepower demands are low. We service before hot summer weather sets in and again after hot weather has passed.

Note temperatures . . . We have experimented and found that thermometers installed in compressor-cylinder discharge lines are an aid to valve maintenance. By noting the temperature of the gases leaving the cylinder —when all parts are good and operating properly—we can detect maloperation of valves by a temperature increase. A program is under way for the installation of thermometers in all compressor-discharge nozzles.

Tide Water does not inspect valves on compressors fitted with discharge thermometers unless the discharge temperature increases. Machines not fitted with thermometers are inspected on regular schedules.

Balanced pressure indicator . . . We intend to do considerable testing on our compressor valves and so are buying a balanced-pressure indicator. This indicator will be used to compare valve losses and compressor efficiencies at various conditions of gas throughput and pressure differentials. This same indicator can also be used on power-end cylinders for analyzing timing, ignition, and combustion-chamber problems.

The indicator will primarily be used on the compressor. We know that valve losses vary with the gas volume being handled. We know also that a valve may not perform with the same efficiency in all compressors. We want to find the best valve or valve type that will best suit our various operating conditions.

Good measuring instruments must be available to analyze valve losses under actual operating conditions. We believe our valve losses to be about 13 per cent and that a reduction of about 5.5 per cent is possible. By running tests on a compressor with various valve combinations, we will be able to determine relative losses and find the valve that is most efficient for our type of operation. Before any major revalving will be done, the more efficient valve will have to undergo a 6 to 9-month operating test to determine its ability to withstand wear and breakage. After proof of mechanical ruggedness, the valves will be put into extended service.

Author is with Tide Water Associated Oil Co., manufacturing department, Avon refinery at Associated, Calif. From paper presented at C.N.G.A. meeting at Los Angeles.

Compressor Piston Rods

At the Avon refinery we have reduced compressor maintenance and down-time requirements for piston-rod and packing servicing by using hard chrome-plated rods. We found that properly applied chrome reduces rod and packing wear and minimizes the necessity of rod and packing replacement.

Rods are prepared for chrome plating by undercutting. Plating thickness is .010 to .015 in. The undercut is finish ground on the reduced diameter. Plating, done by an outside facility, is then uniform and finish grinding is simplified. Precautions must be taken to prevent grease or oil touching the undercut rod prior to plating.

If the rod is sound, plating can be repeated. Old chrome is removed prior to replating. Cost of preparing, plating, and finishing a rod is approximately half the cost of a new one.

We expect a piston rod running in segmental metallic packing to operate 2 years between inspections. We find that the rod and packing combination will operate satisfactorily with up to .005 to .007 in. rod taper.

Experience with chrome-plated rods has shown that they will operate about 6 years before this amount of taper develops. Where abrasives are encountered, the service life is around 4 years.

We have not had an unexpected shutdown from rod or packing troubles for several years. Rods have had to be changed only during regular scheduled shutdowns.

Compressor Pistons and Cylinders—Mechanical Experiences

Compressor piston and cylinder mechanical problems at the Avon refinery have been few. Those we have had have been caused by piston-ring breakage. Breakage in all cases has been on piston rings with a narrow thickness as compared to width. In addition, all broken rings have been cast iron.

Broken piston rings are not particularly easy to detect. The first sign of a broken ring is usually a wall scratching or gouging or a groove or set of grooves at the ends of ring travel on the cylinder wall. Pieces of the broken ring wedge between the piston and cylinder wall and do the gouging. Grooves in the cylinder wall at the end of ring travel are caused by alternate rocking of the ring in its piston groove. This rocking is induced by reversal of the piston travel and by pressure changes across the ring.

Controlling Slime and Algae Growths—4

How Compounds Are Used in Cooling-Water Systems

by P. B. Conlan

USE of the chlorine-ammonia process, copper salts, and phenolic compounds was described in the preceding installment (January 24, 1955, p. 117). Recently, considerable success has been achieved in the control of slime and algae growths by combining the toxic quality of chlorinated phenolic compounds with those of complex metallic ions, such as copper. Where approximately 200 p.p.m. of the phenolic compound has been required for control of slime and algae, satisfactory results have been obtained by slug feeding the combination in a range of 60 to 100 p.p.m.

Bromine . . . This is a member of the halogen family which includes chlorine, fluorine, and iodine. With the successful use of chlorine for the disinfection of water and for the control of slime and algae, some investigations were directed toward the use of bromine for this practice. Bromine is less active than chlorine and, therefore, its disinfecting power is proportionately less.

Bromine is used to a minor degree in the treatment of swimming-pool waters. Some work has been done with bromine to control slime and algae growths in cooling-water systems, but bromine alone has not proved too successful. In some installations it has been used as an intermittent "shock treatment" where continuous chlorination is employed.

Every precaution must be exercised in handling bromine. It is a strong oxidizing agent in both liquid and vapor form. Serious injury can result from contact with the liquid or inhalation of the vapor.

Mercury compounds . . . For many years, mercury compounds have been used for germicidal purposes. The inorganic mercury compounds have a marked toxicity toward humans, and so have not been used to control slime and algae. Several organic mercury compounds have been produced which try to keep the bactericidal value of mercury while reducing the toxicity and corrosive action of these materials. These include the various phenyl mercuric compounds.

Some of the organic mercurial compounds may be aerated readily from the cooling-tower system, thus allowing only a short contact time with the slime-forming micro-organisms. These materials should not be used in any cooling-tower system where the spray might contact humans, or where—because of its volatility — the compound would be present in the air breathed. Extreme care should be exercised and protective clothing should be worn when handling organic mercury compounds.

Quaternary ammonium compounds . . . These are of rather recent development. They show effective toxicity to slime and algae growths when used in relatively high concentrations. Some of these compounds also have powerful bacteriostatic properties and are able to prevent growth of organisms even at low concentrations.

Nevertheless, application of these compounds to industrial cooling water systems has been very limited because: (1) Certain quaternary ammonium compounds have been lost in cooling-tower systems due to volatilization; (2) some of the materials react with or are absorbed by organic matter and so become ineffective; and (3) the presence of high salt concentrations in the water greatly reduces the effect of these materials.

Since quaternary ammonium compounds possess effective surface-active properties, some work has been done with these materials in combination with other slime-control agents. There the presence of the quaternary ammonium compound aids penetration of slime and algae growths by the other toxicant. Alkyl dimethyl benzyl ammonium chloride is one of the many quaternary ammonium compounds presently available.

Fungal attack of wood . . . Considerable study has recently been given to the cause and control of biological attack on cooling-tower lumber. The attack has occurred both on the surface and inside the cooling-tower lumber, and has been identified as the end result of fungal action.

Biological attack is not confined to any particular section of the cooling tower, nor is it confined to any particular type or make of cooling tower. However, the growth of wood-destroying fungi seems to occur more frequently in the mist sections of the tower, such as at or beyond the eliminators.

Internal biological attack leaves the outside of the wood sound while the inside becomes soft and punky. The attack that occurs on the surface of the wood is identified as brown surface deterioration. It occurs most often in those parts of the tower covered by flowing water, such as the fill. It occurs less often in the mist sections of the tower. Surface attack produces a brown, crumbly surface layer. As the attack continues, the smooth surface of the wood becomes fissured with sharp cracks across the grain.

While chlorine is widely used to control slime and algae growths in cooling-tower systems, a nonvolatile type of algicide is desirable to minimize fungal attack in mist sections of the tower. Treatment with copper sulfate and sodium pentachlorophenate can be applied intermittently for this purpose. In some cases, it may be advisable to spray a concentrated solution of the algicide on the affected wood.

Author is with W. H. & L. D. Betz Co., Philadelphia.

W-K-M Valve shows no leak in compression-tension tests

A special test was made in the W-K-M plant to determine what effect external compression and tension loads would have on seal-off and operation of a W-K-M Valve.

This test was conducted using a 30" ASA 400 p.s.i. weld-end gate valve operated by an electric motor. Ten strain gages were placed in the valve at locations shown on the diagram at right.

Using a hydraulic cylinder, an external differential tension load of 675 tons was applied to the valve while maintaining maximum working pressure against the gate.

During the tests the recorded strain-gage readings indicated no fibre stresses in excess of code allowables, indicating no appreciable body distortion. The valve did not leak and operated freely under all conditions.

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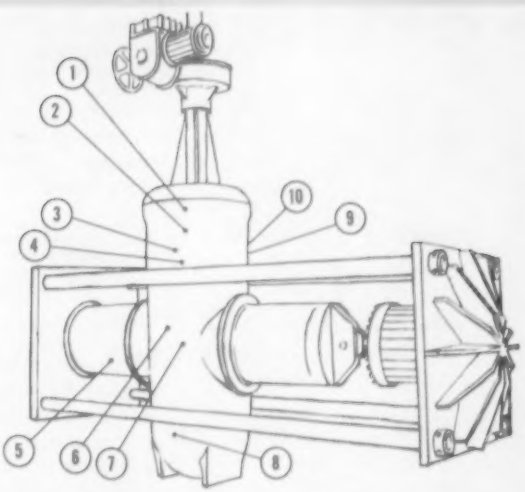

The above sketch shows the placement of the strain gages used in the test.

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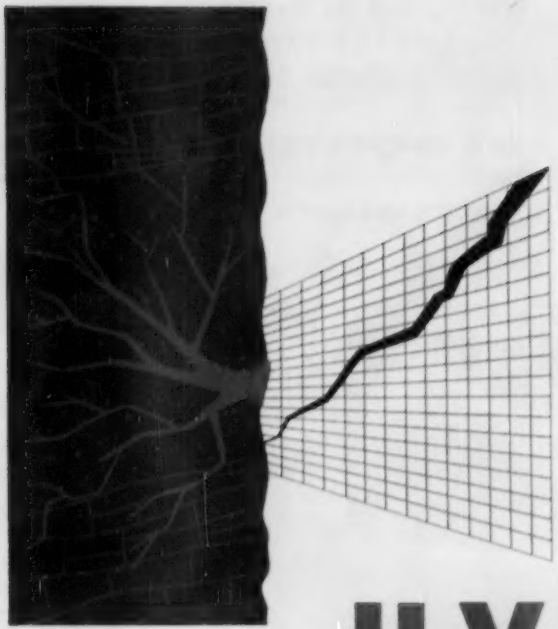

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Among the Drilling Contractors

Zapata Company Forms New Drilling Subsidiary

Zapata Drilling Co. is a newly formed drilling affiliate of Zapata Petroleum Corp., exploration, development, and producing organization, headquartering in Midland, Tex.

The new company is headed by George Busch, president; Hugh Liedtke, vice president; and M. R. (Mickey) Voltz, vice president and drilling superintendent.

It is operating two rotary rigs, both in the Grandfalls area of Ward and Pecos counties, West Texas. One is able to drill to 6,500 ft., and the other to 4,500 ft.

Busch, the president, is vice president of Zapata Petroleum Co., and president of Zapata Offshore Co., another affiliated company.

Liedtke is president of Zapata Petroleum Co., and director of Zapata Offshore Co.

Voltz, active administrative officer of the drilling Co., is new with the Zapata organization, but has had more than 20 years experience in oil-well drilling. He was with Fred Manning, Inc., Denver contractor, for 15 years, and then with Lowell & Voltz, Inc., Colorado Springs contractor, for 4 years, working in the Rocky Mountain region, before going to Midland, in 1953.

Zapata Offshore Co. will drill in the tidelands of the Gulf of Mexico. It will use a $2,000,000 drilling platform, now being built at Vicksburg, Miss., and scheduled for completion by July.

"OK, I've got some buckets—when do we start bailing?"

Strain Drilling Co. has a rig on a wildcat location 2 miles northwest of Adena, in Morgan County, Colorado, where it is drilling as contractor and joint operator with William D. Hewit at 1 Messenger, in 22-2n-58w.

Layton Brown Drilling Co., Woodsboro, Tex., is under contract for a 10,000-ft. test to be drilled for F. William Carr at a wildcat location in southern San Patricio County, Texas Gulf Coast. Location, at 1 McCampbell, in the L. Martin Survey, is 4 miles northwest of Aransas Pass.

Del Mar Drilling Co., Corpus Christi, is contracting for Union Oil Co. of California and Arnold O. Morgan at 1 Coward Unit, a wildcat test 2 miles southwest of Aransas Pass, in southern San Patricio County, Texas Gulf Coast. Location is in the Burton & Danforth subdivision. Hole is scheduled to go to 10,000 ft.

Oil Production Maintenance Co., Houston, is to drill a 7,000-ft. test for Holmes Drilling Co. and Associated Oil & Gas Co. at a wildcat location, 1 King Brown heirs, in the Andrew Weaver Survey, 3 miles northeast of Hankamer, in Chambers County, Texas Gulf Coast. Location is 1¾ miles northeast of production in Hankamer South field.

Barnes Core Drilling Co., Bakersfield, Calif., is contractor on another wildcat test Superior Oil Co. is putting down at Blackwells Corner, in the Mabry area, in Kern County, California. The test, Superior's eighth attempt to find production on its large O.L.C. lease, is projected to 5,000 ft.

J. F. Fletcher, Shreveport contractor, is to drill another well for Marshall Steffenson in the new Baker field, in Franklin Parish, northeastern Louisiana. Location is for 1-B Baker, in 35-16n-9e, 1,500 ft. southwest of Steffenson's discovery well, 1-A Baker, completed last December with gas-condensate production from Paluxy sand at 5,175 ft. It is the third well for the area.

Penrod Drilling Co., Shreveport, will drill W. C. Feazel's projected Cotton Valley test 2 miles southeast of Beth-

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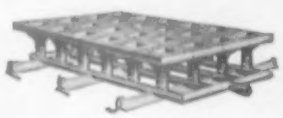

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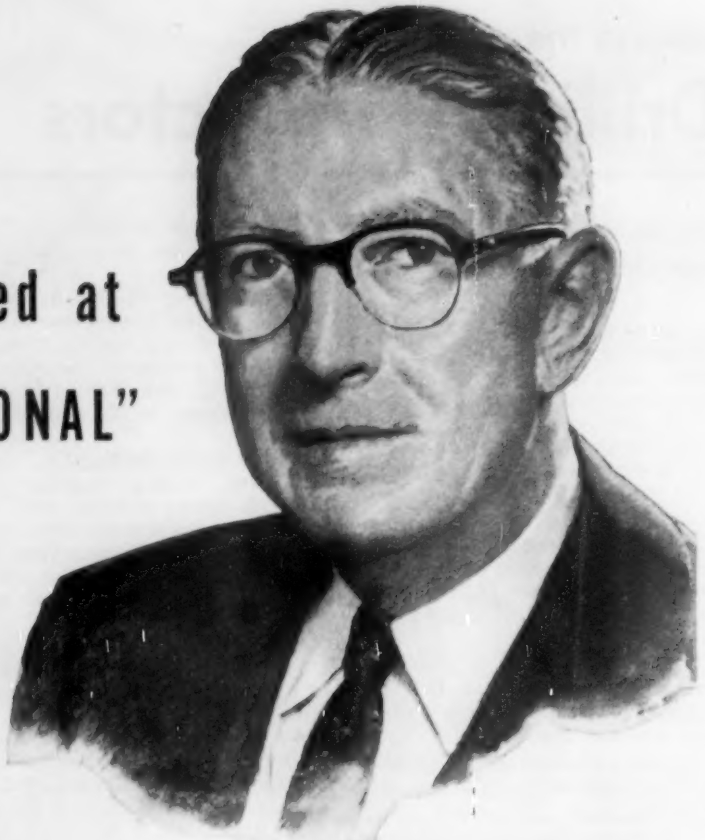

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The Oil and Gas Journal

Box 1260 Tulsa, Okla.

any, in Caddo Parish, northwestern Louisiana. Location, at 1 Albred, in 28-16n-16w, is about 1½ miles from nearest Cotton Valley production. Hole is to be carried to 8,800 ft.

Riggs Drilling Co., Inc., is lined up for at least six additional wells to be drilled for Lion Oil Co. in the shallow Cottage field, in Bossier Parish, northwestern Louisiana. The contractor is completing 2 Thompson and moving rig to the first of the new locations. Pay zone is in the Buckrange formation at depths about 2,000 ft.

John S. Hagestad Drilling Co., Bakersfield, Calif., is making hole on the first of two deep tests it has contracted to drill for Tide Water Associated Oil Co. in Northwest Belgian Anticline field, near McKittrick, in Kern County, California. The first test, in 16-30-21, is scheduled to go to 9,000 ft.

Dominion Drilling Co., Ltd., Edmonton, Alta., is moving a rotary rig to a rank wildcat location, 32 miles west of the nearest Cardium-sand oil producer in the Pembina region, in western Alberta Province, where it will drill a Cardium test for Union Oil Co. of California. The test will be carried as 6-36 Wolf Creek, with location in LSD 6, 36-50-15w5. Hole objective is 7,500 ft.

Dallas Drilling Co. is under contract for another Triassic wildcat test J. B. White and A. M. Lloyd and associates are undertaking in the Cameron River region, northeastern British Columbia. The new test, 1 Indian Reserve, in LSD 15, 14-86-25w6, is 3 miles southeast of the operators' recently completed oil-discovery well, 1 Halfway, 40 miles northwest of Fort St. John. Objective is about 4,000 ft. in depth.

Layton Brown Drilling Co., Corpus Christi, is drilling a 7,000-ft. test for Coastal Trend Oil & Gas Co. at a wildcat location 4 miles southeast of Driscoll, in Nueces County, lower Texas Gulf Coast. Listing is 1 Schubert.

Bush Drilling Co. is starting on its second well for F. E. Jameson, Beaumont, Tex., operator, in Clear Creek field, Allen Parish, South Louisiana. It is at 2 Perkins, in 5-6s-7w. Contract is for 9,000 ft.

Neal Drilling Co. is contractor on a 7,700-ft. wildcat test Southern Minerals Corp. is putting down at 1 Harwood, in the Samuel Isaac Survey, 2 miles south of Gaston, in northern Fort Bend County, Texas Gulf Coast. Location is about 1¾ miles west of Southwest Clodine field.

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Composite Catalog Page 3433

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Natural gas producers, small and large, are convinced that if the American people understand the issues regarding federal regulation they will reach the right decision. Therefore, we are endeavoring to lay the subject before the people and to encourage the fullest possible discussion of the issues. To do so, this advertisement has been placed in newspapers throughout the country.

What the Regulation of Gas Supply Means to 25,000,000 American Families

THE FIVE THOUSAND producers of natural gas—large and small—believe that the free competitive system which has increased your gas supplies and kept rates low is the best for consumers, for the industry, and the economy.

They believe the proposal to abandon competition and clamp bureaucratic controls on gas production will hurt consumers, damage the industry, and *benefit no one*.

Here are some answers to questions you as a consumer may have on this vital issue.

What Is This Regulation?

Sixteen years after a 1938 law was passed, a new interpretation of some of its words now forces the Federal Power Commission to do what it has eleven times refused to do—try to fix the price that an interstate pipeline pays the 5000 competing producers who find the gas and get it from the ground.

Will This Regulation Reduce Our Gas Bills?

Hardly. Only about 10% of the average gas bill goes to the producer who finds the gas and sells it. The other 90% pays for constructing, maintaining and operating the long-distance pipelines and local distribution systems—already regulated.

How Will Regulation Affect Supply?

It will reduce the supply. Most natural gas is produced by "wildcatters" and other independents. They are used to keen competition and big risks. But put them under Federal controls—with permits, endless forms, licenses, hearings and suits—and the work of exploration is sure to suffer. Three new pipeline projects to bring gas to more consumers have been suspended since regulation took effect.

Hasn't Gas Always Been Regulated?

Gas *distribution*, yes. It makes sense to have only one pipeline bring gas to a community—and one gas company distribute it in the community. Both do a good, efficient job for you, and as monopolies they are naturally regulated.

But there's no monopoly in *finding* gas. Far from it. Gas *production* is risky and keenly competitive. There are five thousand large and small producers looking for gas—and finding it in only one out of

every nine exploratory wells they drill. They compete vigorously to sell their gas. A single pipeline may buy from 200 or more producers.

Is Gas Different from Coal or Oil —or Grain?

It isn't. And if there's price-fixing for natural gas at the well so can there be next for coal at the mine or oil at the well—or lumber in the forest, or grain on the farm.

How Did The Consumer Fare Before This Regulation?

Here's the record. In the past 16 years natural gas production has increased 200% and the price the consumer paid for gas has risen only 1/11th as much as the general cost of living.

Do Only A Few Big Companies Produce Gas?

No. The largest 37 companies produce less than half the nation's gas. No single company produces more than 5%. The small producers do more exploratory drilling than do all the big companies combined. And none of the producers has any monopoly, any exclusive franchise, or any protection.

What Is The Natural Gas and Oil Resources Committee?

It is made up of companies and individuals concerned with natural gas. It includes a great many large and small gas and oil producers. All believe there is no more reason for OPA-like price-fixing on gas than on steel, coal, autos, meat, or shoes, which could be next. All believe that free competition is better for all of us than a price-controlled economy, which has historically led to stagnation, scarcity and rationing.

What Can I Do?

You can reason out the issues, reach your own conclusions, and make those conclusions known to your friends and neighbors.

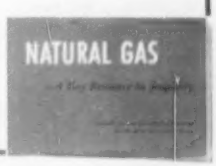
Under free competition without federal regulation—

- Natural gas became plentiful—output rose two hundred per cent in the past sixteen years.
- Natural gas stayed reasonable—and gas prices to the consumer rose only one-eleventh as much as living costs in the past sixteen years.
- Natural gas has helped create thousands of jobs in industry and now supplies one-fourth of the nation's energy resources.

NOW.....cumbersome federal controls threaten all this progress.

FOR MORE FACTS WRITE FOR THIS BOOKLET NOW!

You have the right to know the facts about this new government regulation—a peacetime control of free, competitive producers. Send today for the booklet, "Natural Gas—A Key Resource in Jeopardy.



NATURAL GAS AND OIL RESOURCES COMMITTEE

Room 5401, 350 Fifth Avenue, New York 1, N. Y.

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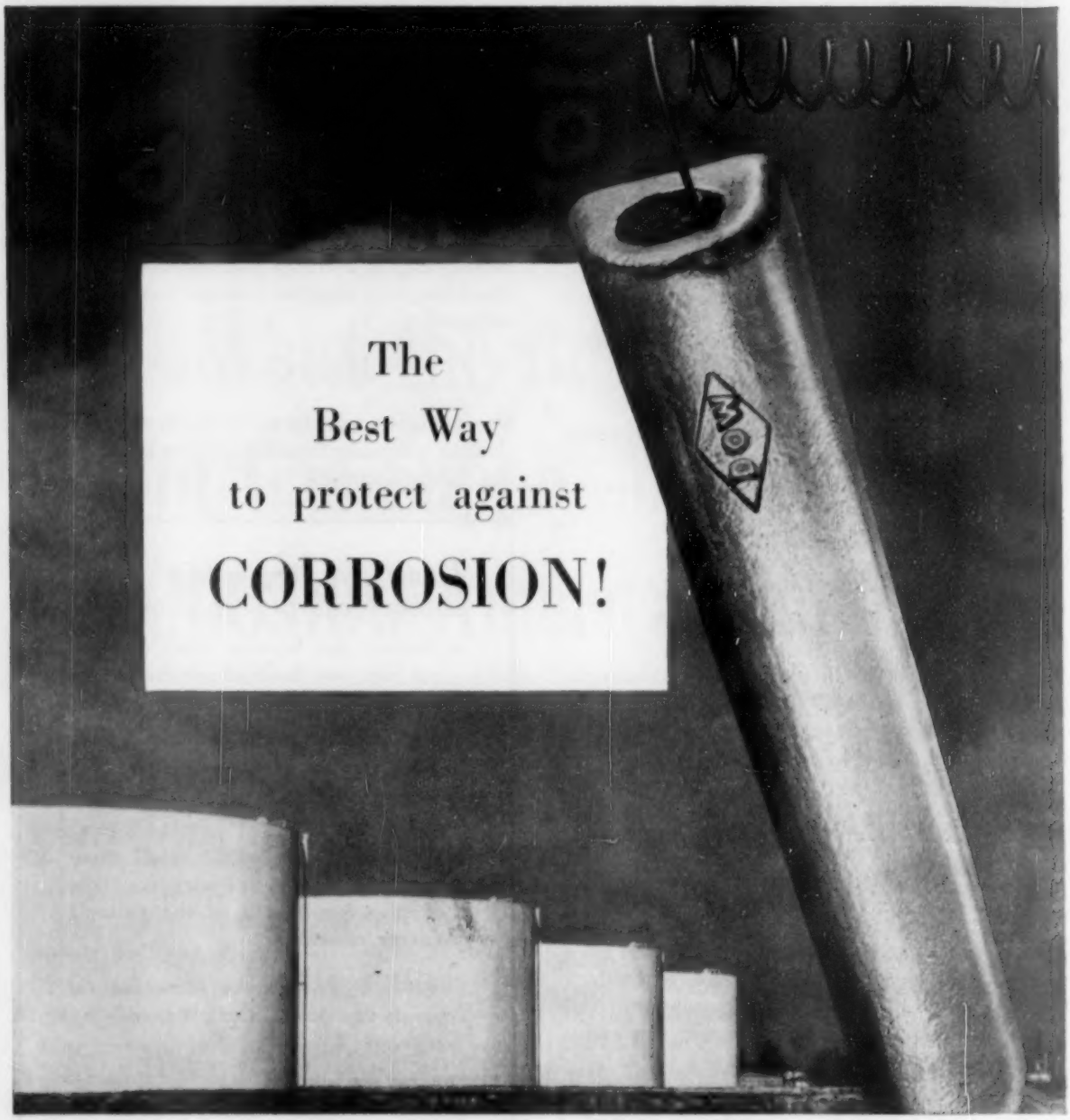

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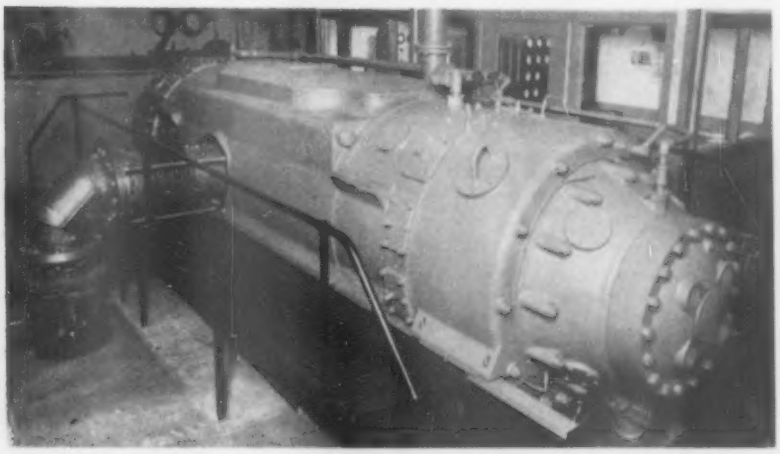

SIMPLICITY and high efficiency of the free-piston engine will make it a strong competitor with other prime movers. Above is a 1,500-hp. unit with pipe connections to a turbine.

Free-Piston Gas Turbine

4. What is its future?

by Robert P. Ramsey

• This final article in a series on the free-piston gas turbine speculates on future uses of the machine. Previous articles described how it works, estimated costs for its use on pipelines, made comparisons with other prime movers, and gave its thermodynamic characteristics.

Since this paper was written, a contract has been let for installation of a free-piston engine in a cargo vessel. Resulting service tests will show its worth for use in other industries.

WHY isn't it used? . . . If free piston idea is so good, why isn't everyone building them? The question is interesting and certainly deserves an answer. The first answer is that not everyone knows how. Everyone likes to keep on making things that require the least amount of effort and change in thinking or habit. Many people know crank engines, and we must remember that the free-piston turbo is the infant among prime movers. The least is known and understood about it.

If the U. S. Navy had not financed the early work which was done in this country, it is very problematical when, if ever, any private industry would have spent its own money to do it. That Navy work opened the door to some understanding of the problems. It has taken a long time and a great deal of painstaking determination and money to get the job done.

It is always more difficult to engineer a job that eliminates parts than it is to do a job that permits the use of more and more parts. Some of the current compound-engine thinking is derived largely because it is easy to understand. Yet if the compound engine is thought through to a conclusion, it does nothing that the free piston cannot do. Many of the principal parts like cranks and rods cancel out in the final free-piston equation. The compound engine is thus handicapped.

This has been a difficult engineering job, not an easy one. Many old techniques believed to be applicable from crank-engine practice were tried, but could not be used. New ones had to be developed. One by one the problems have been solved: the fuel pump without a rotating cam; the piston with a head on both ends and no connecting rod or crank to fasten it to; the cylinder without a crankcase; the valves that work like the gills of a fish. The remaining work is refinement of detail, increased power through supercharging, and combustion with all of the commercial fuels.

What did anyone really know about gas turbines a few years ago? World War 2 provided about all that we now know. The newest of the gas-turbine types is the free piston. It was conceived only yesterday, so to speak, and today its evolution is combining the high efficiency of the piston engine with the simplicity of the turbine.

There is no reason whatever why a small, simple, free-piston generator under the hood of an automobile or across the axle of a bus or truck cannot be built to drive a vehicle through a simple, torque-converting gas turbine. It is the only known way to produce a turbine drive that is more efficient than that of a crank-type engine.

The future . . . The locomotive, the tractor, or the tank may be driven by the free-piston turbine by development of what engineers now know. This can be done with all the flexibility of electric drive and without the economic weight and cost penalties.

In its presently developed form the free-piston turbine appears to be ideally suited for the propulsion of cargo vessels and tankers and tugs, for pipeline pumping, and for making electric power. It also produces large amounts of hot combustion gas under pressure. This may be useful for chemical processes, for making power and supplying process heat cheaply, for vibrationless offshore drilling, for use in vessels where noise transmission through water is important, and for many other purposes.

It seems feasible that individual units may be developed as large as 5,000 hp. per cylinder, and there seems to be no actual limitation to the numbers and combinations which may be applied in one large power plant.

With all of these potentialities, why is this prime mover not being used for all these purposes? It is new. It has not yet proven all its obvious possibilities. It is not yet entirely perfected. It will have teething troubles in its early years. It faces the keen competition of already highly developed mechanisms. And it is known by few and understood by less. Yet as long as petroleum and natural gas remain commercial fuels, the free-piston cycle can make a very real contribution.

Author is assistant to the engineering vice president, Cooper-Bessemer Corp., Mount Vernon, Ohio. Series material is from a paper presented in Los Angeles, September 1954, at the petroleum division conference of the American Society of Mechanical Engineers.

ANOTHER TRIUMPH IN APPLIED PRACTICAL "IMAGINEERING"

Bringing the atom smasher TO

P.E.S.A. members venture their capital in basic research, so as to be ready with the solution of tomorrows oil industry problems:

Take the P.E.S.A. service companies for example. Here you can find atomic scientists working in laboratories that remind one of Los Alamos during the feverish rush to beat the scientists of the enemy in developing the atomic bomb. One of the many well-equipped laboratories has a van de Graaff accelerator, one of the family of atom smashers used by the Atomic Energy Commission and major nuclear research laboratories throughout the world for the study of atomic phenomena. This van de Graaff accelerator has an operating range of a million to 10 million volts. Many uses are foreseen for this atom smasher, but its primary use is as a source of atomic particles for precise and fundamental research in radioactivity well logging.

The van de Graaff instrument can produce a flux of neutrons as great as that which could be obtained from a neutron source using many grams of radium. Thus a machine originally developed to aid in the advancement of nuclear physics and atomic power will serve equally well as an instrument of progress in the oil industry.

By varying the kinds of ions that are accelerated by the built-up high potential and by varying target material which the ions are beamed to strike, it is possible to produce a great variety of nuclear reactions—neutrons, gamma rays, beta rays, protons, X-rays, or alpha particles. The neutrons and gamma rays are the ones most used in well logging at the present time.

Uses of neutrons and gamma ray curves: The gamma ray curve is a measurement of the amount of radioactivity that is natural in the formation penetrated by the bore-hole. The neutron curve is the measurement of the amount of fluid in the formation. It is obtained by bombarding the formation with a strong source of neutrons and measuring the induced radiation. These two curves, with a casing collar log, provide the complete radioactivity well log which indicates formation characteristics in either open or cased holes.

* * *

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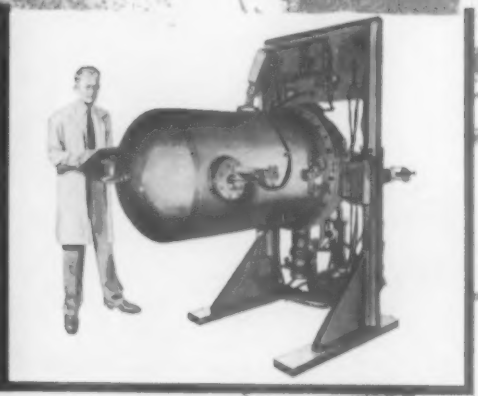
THE OIL FIELDS



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RECONDITIONING worn tractor parts can save money in many instances. For example, this installation of new valve seat inserts in an old tractor engine is economical and practical.

Can you really save money by reworking old tractor parts?

by D. R. Lammers

NEW parts are now readily available for pipeline construction equipment. Because of this, machine owners should carefully consider the value of reworking worn parts. Many ingenious methods of reclaiming worn tractor parts have been practiced in recent years. Some of these salvage methods proved practical and economical. Others were expensive but necessary to keep badly needed machines in operation.

Two factors should be considered in deciding between reworking an old part or buying a new one. First, the reconditioning should cost much less than the new part. Second, the expected life of the reconditioned part should approach that of a new one. Obviously, if these conditions are met the owner will prefer reconditioning. Many times, however, it will prove cheaper to buy new parts.

Common practices . . . Many reconditioning practices are so practical and have been used universally for so long that we forget to classify them as such. Among these are regrinding crankshafts, turning track pins and bushings, and reboring and sleeving of bearing bores in transmission cases and final drive covers.

Author is service manager, Caterpillar Tractor Co.

Etching and raising the ridge in worn cylinder liners, using wide top compression rings on worn pistons, and installing valve-seat inserts in cylinder heads are common salvage practices on engine parts. Hard-facing of cutting edges and bucket teeth, straightening of sheet-metal guards and hoods, and building up by electrically welding the worn spots on heavy fabricated steel parts will remain popular because they save money.

Other practices have become common due to parts shortages in the past. They will continue to be popular because they proved practical. Included in this group are building up track grousers, track rollers, idlers, and sprockets, and regrinding track-roller shafts using undersize bushings.

Welding new rims on sprockets, building up the outside of worn steering-clutch drums, (or using extra-thick brake linings), and installing clutch drive rings in flywheels are other widely accepted practices. The simple taper-pin method is common for the repair of cracked cylinder heads.

Track links have been built up successfully with electric welding rod, but

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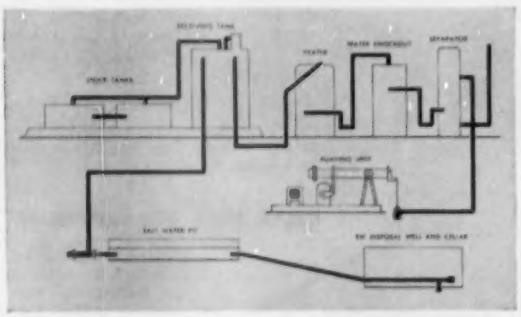

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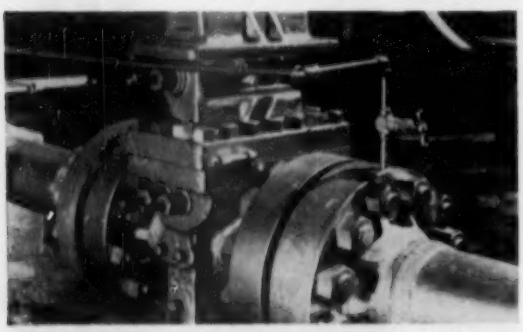

High pressures on equipment like this shutoff valve are locked in tight with Republic Alloy Steel Studs. It's the high tensile strength in Republic Alloy Steel that does the trick . . . provides strength that can be relied on—even under extreme conditions. Sharp, accurate threads provide maximum holding power, resistance to wear, trouble-free backoff for maintenance. Order Republic Alloy Studs from your distributor—for new equipment or replacement.

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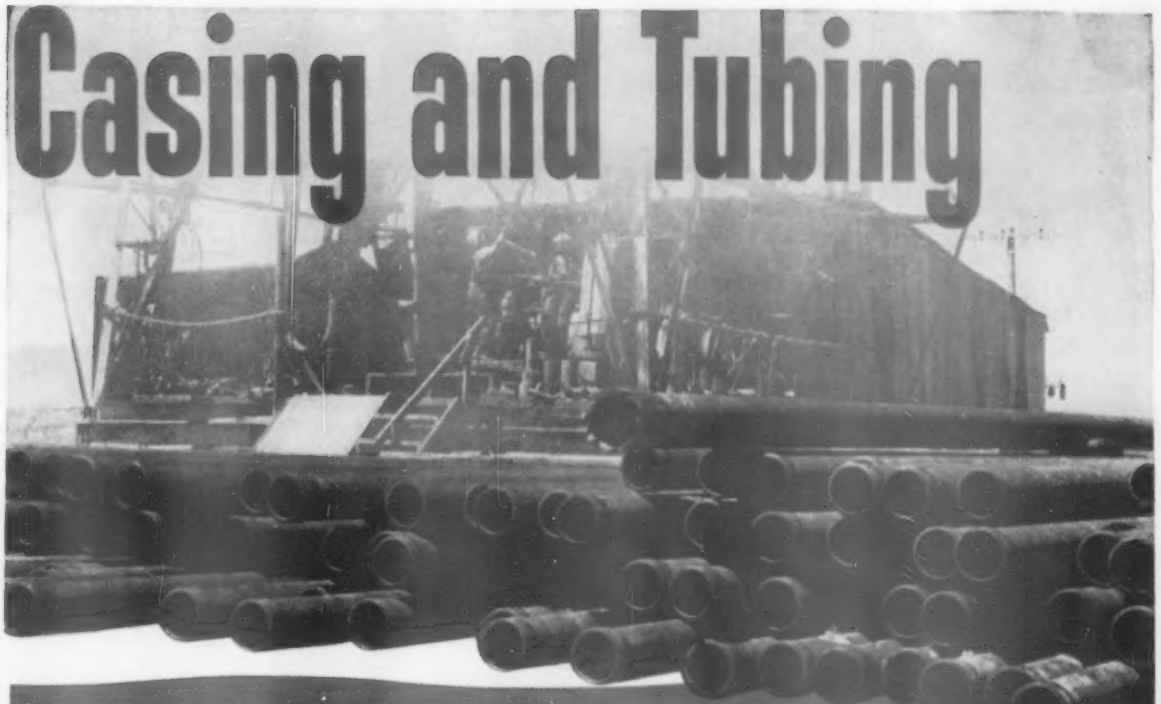

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Two stopper fittings with a by-pass line may be used to isolate a section permitting tie-in of new or larger lines for greater capacity; relocate lines for greater economy; or isolate equipment for repair or replacement—all without interruption of flow.

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These are just a few of the stop-off jobs possible with the No. 4 Line Stopper Unit.

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Mueller No. 4 Line Stopping Equipment making stop-off on 12″ crude oil line.

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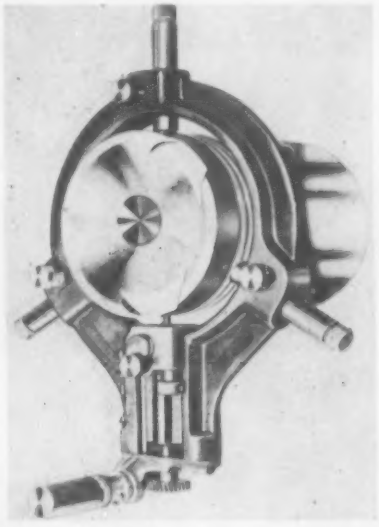
the economy of this operation is questionable. The advisability of repairing track links by this method can best be determined by local experience.

Unwise practices . . . Some reconditioning procedures are practiced which are definitely inadvisable. Foremost among these is the repairing of fuel-injection pumps. This frequently results in inaccurate timing of fuel injection because of variations in dimensions of fuel-pump bodies. Repairmen invariably neglect to compensate for these variations. The discrepancies in timing usually are not great enough to cause noticeable malfunction of the engine. But they could easily nullify the saving by increasing the fuel consumption or rate of depreciation of other engine parts.

An owner will spend less for fuel-injection pumps by buying new pumps when the old pumps are worn enough to cause hard starting or a noticeable lack of power.

Regrinding crankshafts to intermediate undersizes is another example of false economy in reconditioning parts. It is better to use the shaft until it is standard undersize. Regrinding long before the crankshaft reaches this point is unnecessary and a waste of money. It also requires additional labor in the special fitting of bearings.

In summary, the practice of sound, economical parts reconditioning results in better and lower-cost service for machine owners.



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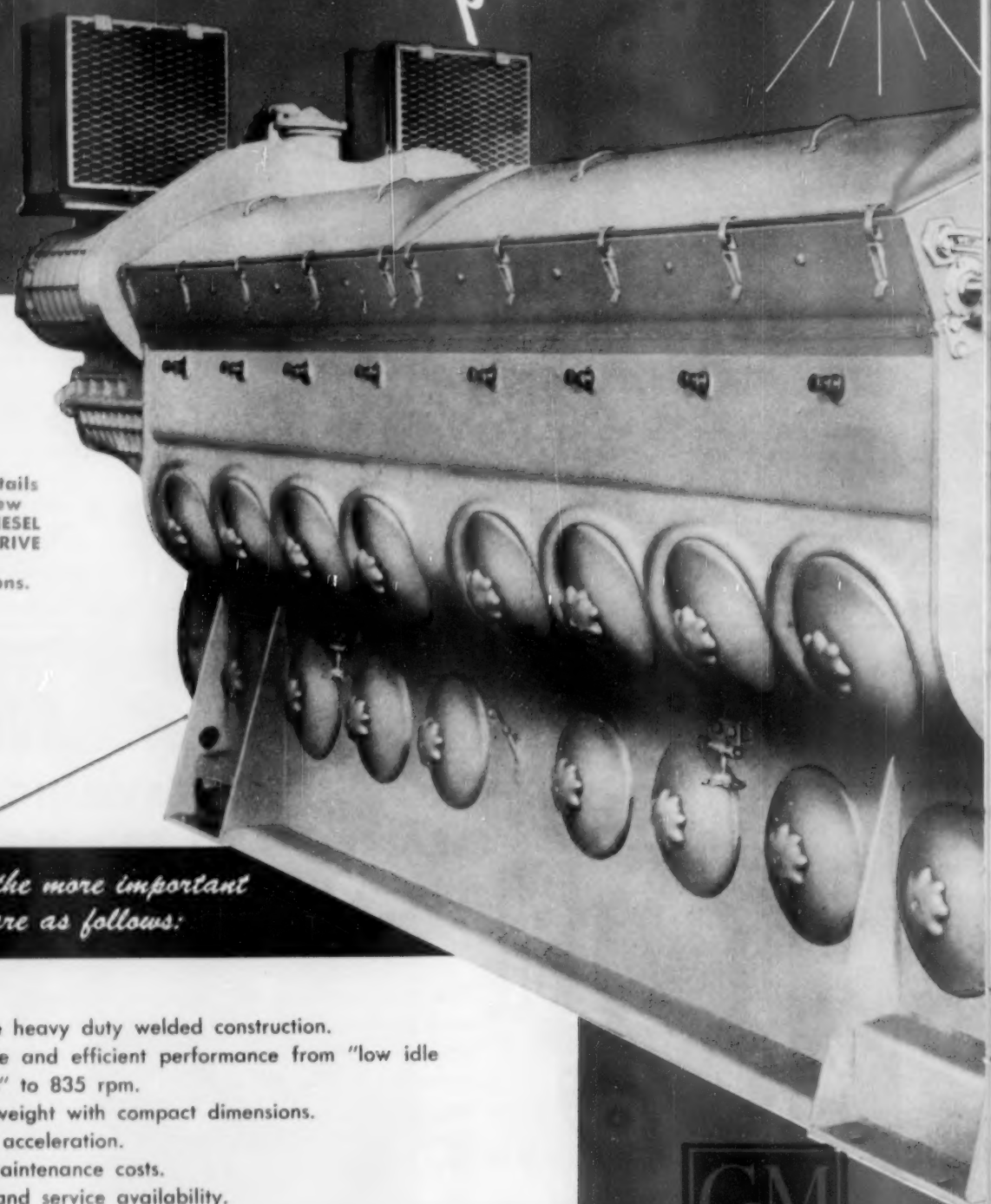

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Light weight with compact dimensions.
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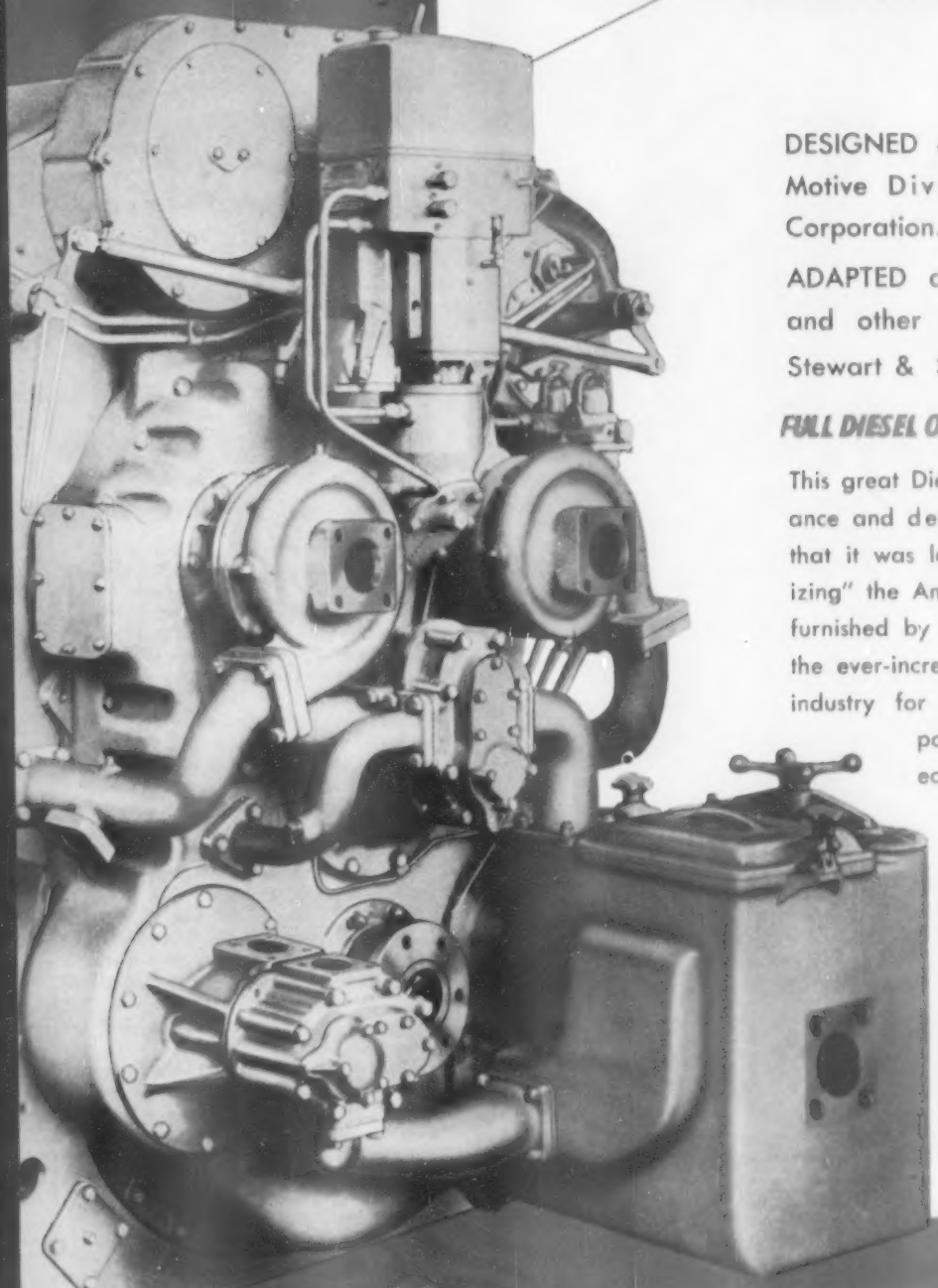
DIESEL
POWER

MODEL 567-C General Motors Diesel Engine



DESIGNED and built by the Electro-Motive Division of General Motors Corporation.

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FULL DIESEL OR DUAL FUEL-600 to 1750 HP

This great Diesel with a record of performance and dependability, so outstanding that it was largely responsible for "dieselizing" the American railroads, can now be furnished by Stewart & Stevenson to meet the ever-increasing demands of the drilling industry for more flexible, higher horsepower with maximum fuel economy and long life.

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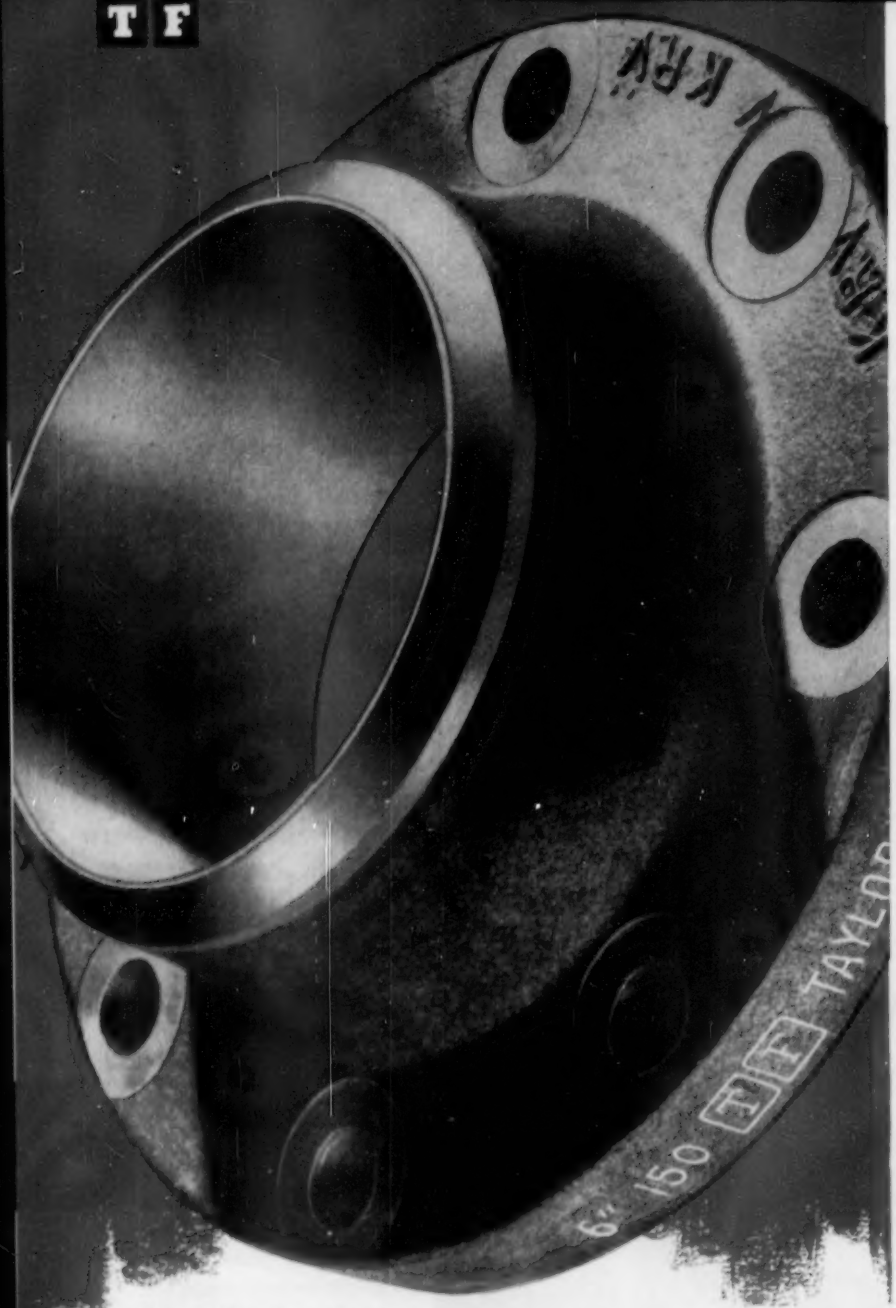
Distributors of — General Motors Diesel Engines, Climax Blue Streak Engines, Chrysler Industrial and Marine Engines, Petter Diesel Engines.
Fabricators of — Electric Power Units, Electrical Control Equipment, Portable Pumping Units, Truck Bodies, Red Head Pumps.

PARTS • SERVICE
STEWART & STEVENSON SERVICES
ANYTIME • ANYWHERE

WeldELLS *have everything*

T F



Yes, Taylor Forge made the forged steel flange and the forged steel flange made Taylor Forge. The perfected welding neck flange, illustrated here, was pioneered by Taylor Forge and is a part of the superlative WeldELL® line.

See your Taylor Forge Distributor for up-to-the-minute facts.

TAYLOR FORGE

TAYLOR FORGE & PIPE WORKS • General Offices and Works: P.O. Box 485, Chicago 90, Illinois
Offices in all principal cities • Plants at: Carnegie, Pa.; Fontana, Calif.; Gary, Ind.; Hamilton, Ontario, Canada

Through Evolution to Revolution

In 1929 Taylor Forge announced the first line of welding neck flanges. Although modestly presented at the time, this later proved to be a revolutionary development . . . the forerunner of all butt-welding fittings.

Actually the welding neck flange was an evolution of Taylor forged steel flange production which had paced the dramatic rise of pressures that started early in the century. The first call from the power and process industries for better ways of containing pressures came as far back as 1910. It was then that the first blow was struck at corrosion and weakness by the Van Stone joint, subsequently perfected by Taylor lap joint flanges and stub ends.

This was the ultimate in pipe joining until torch welding replaced forge welding. Taylor Forge foresaw the possibilities of the torch, and its later affiliate, arc welding. Old timers here like to recall that Taylor Forge was first in Chicago to experiment with oxyacetylene welding as far back as 1905 when the process was brought to this country from France, and that Taylor Forge was also among the early pioneers in metallic arc welding.

It was therefore a "natural" for Taylor Forge to be ready, when on-the-job welding became commercially practical, with the first flange designed for butt welding—the welding neck flange. Taylor Forge thought of it as merely one part of the development of the WeldELL line which had begun in 1926 and was announced shortly after the welding neck flange.

Pressure piping had gone through evolution to revolution.

An episode in the story of Taylor Forge leadership in designed piping

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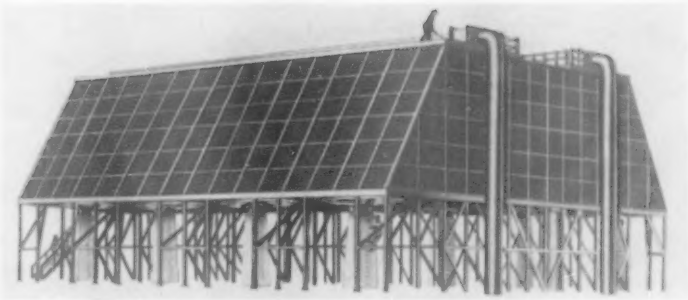
. . . What's New in Equipment?

Use the handy Time-Saver Cards ✓✓✓ to obtain additional information on these items

by Dan B. Miller



Cooling Tower Controls Recirculation

Representing a rearrangement of a standard tower's component parts, the new Santa Fe Wind-trol offers the advantages of improved operating efficiency by controlling recirculation and increased functional life span with reduced maintenance requirements. The new design shows marked indications for completely eliminating the hampering effect of wind on its performance. The new Wind-trol tower can therefore be located without respect to wind direction.

The change in arrangement nullifies the effect of recirculation caused by the tower structure upon itself. Uncontaminated air is allowed to pass freely beneath the structure and supply fans on both sides of the tower with an excess of air discharging from the tower's leeward side. Recirculation is prevented, since the exhaust vapors must move against this discharging wind stream. The control of recirculation and winds inherent in the Wind-trol design makes the return to a forced draft tower both practical and highly economical.

Mounted on an open substructure, the tower and its redwood basin are supported by cast-in-place concrete piles. Drilling the holes for these piles is easily accomplished with a mechanical auger and without using forms. The new cooling-tower design affords absolute protection from costly vibration damage. The forced draft fans, which are individually mounted on the ground on either steel-pipe columns or small concrete structures, are not connected to the structure. The fans are located outside of the packing area, discharging vertically in the external, vertical plenum area; and are placed so no harmful sunlight, rain, or hot vapors come in contact with blades or machinery.

The basin of the Wind-trol is constructed of very dry, specially selected, all-clear heart redwood. After fabrication, the basin is coated with a special waterproof membrane. Moist air sections not continuously wet are entirely removed in the counterflow Wind-trol and decidedly reduced in the crossflow model. The distribution area is readily accessible for cleaning; and flushing is possible at ground level. *Santa Fe Tank & Tower Co.*

Check No. 1 On The Time-Saver Card

●

New Wire Rope Offers More Strength Per Size

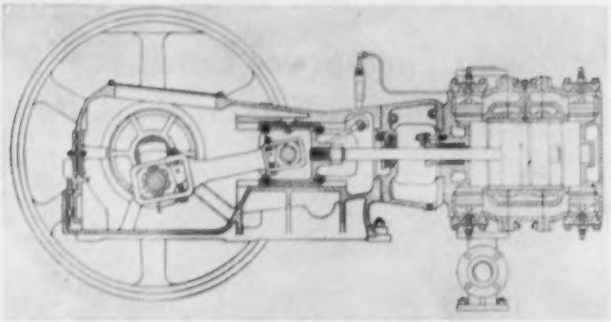
A new, high-strength wire rope is reported to be 15 per cent stronger than the best grade of wire rope now being manufactured. The new grade of rope is expected to simplify the use of wire rope generally and to permit lighter-weight equipment to be designed at lower cost. An average tensile strength of 300,000 psi. has been achieved by the use of special precise-analysis, high-carbon steel wire and improved processing.

The preformed rope, to be known as VHS, designating very high strength, will be marketed by both the Hazard Wire Rope and American Cable Divisions. It has been widely tested in heavy-duty construction, mining, petroleum, and logging installations where its service life more than doubled that of existing cables. Present diameters of the new product range from ½ to 2 in.

In addition to 15 per cent greater tensile strength than improved plow steel, VHS cable is more wear-resistant and will keep its shape under pressure. It has greater fatigue resistance, is tougher, and resists plastic deformation, or the tendency to become hide-bound. A new lubricant is used which is designed to last for the life of the rope. The added strength, in the same diameter of wire rope, gives additional weight-lifting capacity for deeper drilling. In some cases, fewer lines may actually be required. Rotary drilling line in 1⅛-in. diameter weighs 2.23 lb. per ft. and has a breaking strength of 130,000 lb. The same line in 1½-in. diameter weights 3.96 lb. per ft. and has a breaking strength of 227,400 lb. *American Chain & Cable Co.*

Check No. 2 On The Time-Saver Card

What's New... Use the handy Time-Saver Cards



Compressor Requires Less Horsepower

The class ATH water-cooled, double-acting, heavy-duty compressor design employs an air cylinder in three sections: fronthead, jacket, and backhead. The jacket incorporates a cylinder liner, press-fitted into position and replaceable. Inspection of the bore and cleaning of water passages may be readily accomplished by removing the nuts from the studs which secure the backhead to the jacket.

Counterflow of cooling water from the bottom of one head, over and out the top of the other head, creates an improvement in cooling efficiency. This arrangement plus increased cooling area adjacent to the valves in this valve-in-head design result in a marked reduction in the quantity of cooling water to maintain approved temperatures.

Improvement in heat transfer allows these compressors to operate at a temperature below that possible on other designs, a factor which reduces the horsepower needed for operation. *Pennsylvania Pump & Compressor Co.*

Check No. 3 On The Time-Saver Card

●

Tractor Is Specifically Designed for Pipe Laying

The Cat No. 583 Pipelayer was developed after nearly 5 years of research and testing. This unit is the first such machine engineered from the ground up as a pipelayer.

The No. 583 has a lifting capacity of 130,000 lb., more than any other pipelayer. It has a 21-in. ground clearance. Its new power takeoff permits power to be routed directly to the pipelayer master clutch. The pipelayer drive is completely independent of the tractor master clutch and the torque converter. The engine delivers 190 hp. at 1,200 r.p.m. The transmission is a combination three-stage five to one torque converter and a special three-speed transmission.

The No. 583 has superior stability with 86-in. gage, 28-in. track shoes, 7-roller track frame, and an over-all length of 211½ in. Engine and boom are centered and counterweights are split fore and aft of the winch mechanism.

Hydraulically actuated counterweights pivot at the bottom, giving good side and bottom clearance. The counterweights retract over the track giving better equalized ground pressure, greater facility for leap frogging or for operating on a narrow right-of-way, and narrower over-all width for transporting.

The positive-locking pawl on the boom drum provides an extra safety factor to avoid accidental dropping of the boom. An interlock prevents accidental reversal of boom drum with pawl engaged. Hydraulic steering boosters have live-pump drive direct from the engine and there is an automatic boom kickout. The pipelayer winch and counterweight controls are arranged for safety as well as ease of operation. Boom and load-line brake levers have handles distinguishable by feel.

The new six-cylinder engine with a new fuel-injection system gives excellent torque rise, capsule-type injection valves and new governor. There is a powerful gasoline starting engine with electric starting system. *Caterpillar Tractor Co.*

Check No. 4 On The Time-Saver Card

●

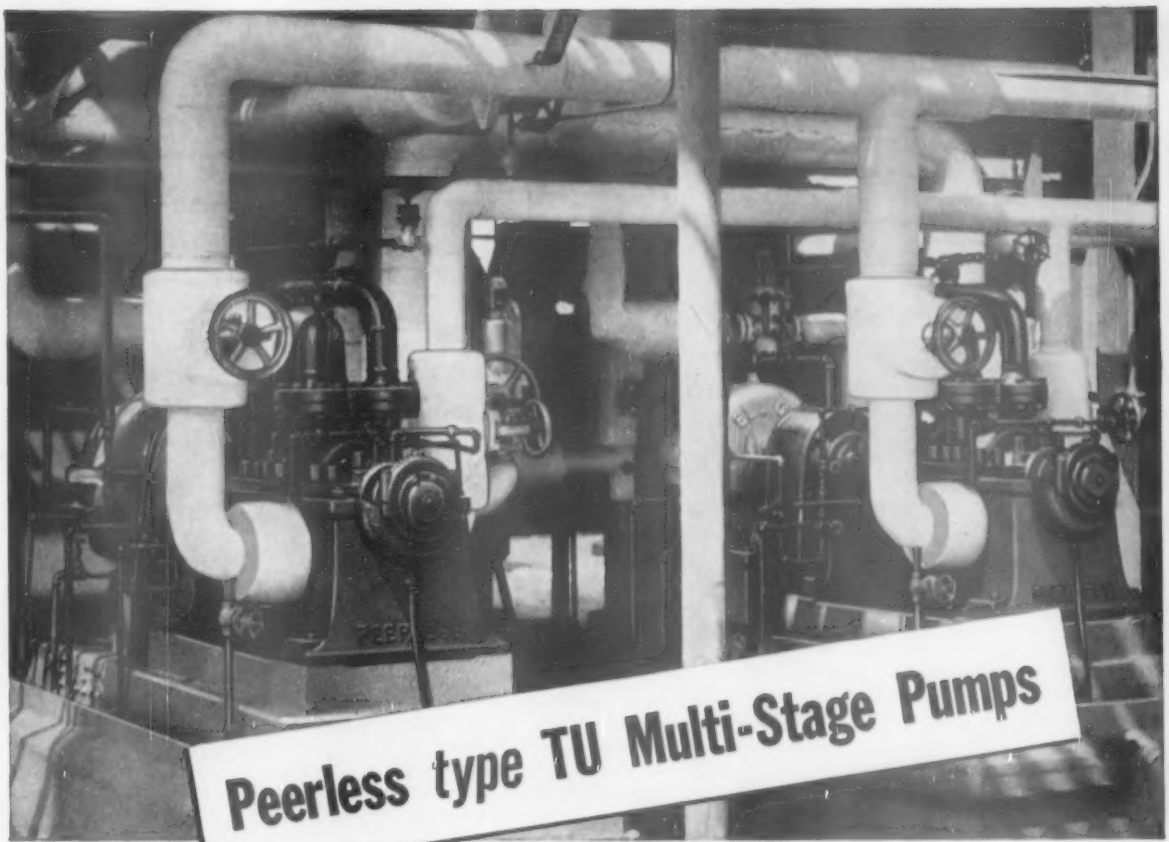
Flash-Point Tester Placed At Distribution Point

The automatic loading-rack flash-point tester is an accurate, rapid means of checking flash points of distillate-fuel shipments in delivery by transport truck or tank car, or at pipeline terminals, storage tanks, or tanker wharves or at any bulk distributing or storage point.

Operated by either the truck driver or the loader, the tester automatically performs flash tests at the loading rack, in 2½ minutes or less, and stamps approval on a card with the date and time. The instrument correlates with ASTM D 56, and does not require laboratory installation or a skilled technician to operate. It eliminates the 4 to 6-hour delay often found when a manually operated tester is used.

A fuel flashing at a temperature lower than the setting of the tester cannot be approved; no amount of manipulation by the operator can pass an unsafe sample, nor can more than one approval be obtained at a time. The flash-approved stamp on the card is positive proof that a test has been run. Accuracy is within ± 1° F. *Precision Scientific Co.*

Check No. 5 On The Time-Saver Card



Peerless type TU Multi-Stage Pumps

PEERLESS PUMPS

4 COST-SAVING FEATURES OF THE TYPE TU LINE

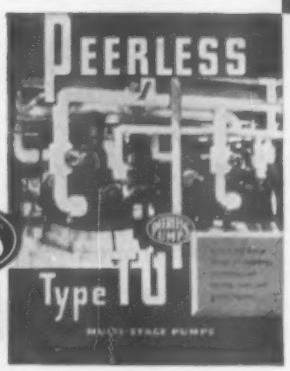
- *SIMPLICITY IN DESIGN*
- *GOOD HYDRAULIC CHARACTERISTICS*
- *DURABLE, RUGGED CONSTRUCTION*
- *ON-THE-JOB DEPENDABILITY*

2, 3, 4 AND 5-STAGE PUMPS FOR SUPPLYING CIRCULATING AND BOOSTING WATER AND PROCESS LIQUIDS AGAINST MEDIUM AND HIGH HEADS. Put these dependable pumps to work for you. They'll deliver high maintained efficiencies over an extended service life. Their split-case design makes them easy to service and maintain. Their precision construction guarantees year after year durability. In all sizes 4" and under, cross over between stages is built integral with upper pump case. Over-size shafts, wear rings, shaft sleeves, heavy duty ball bearings, modern case and impeller design are outstanding features. Choose from many types and sizes for all head and capacity requirements.

PROFUSELY ILLUSTRATED BULLETIN. A new 4-color bulletin describes the Peerless Type TU pumps. It's complete with pump cross-section, dimensional drawings and load-capacity data. Use coupon below.

GENERAL SPECIFICATIONS

HEADS	Up to 1600 Feet
CAPACITIES	Up to 3000 GPM
TEMPERATURES	Up to 300°F
CASE PRESSURES	Up to 800 Lbs.
HP RANGE	Up to 325 BHP
DRIVES	All Types
CONSTRUCTION	Cast Iron, Bronze, Stainless



PEERLESS PUMP DIVISION
FOOD MACHINERY AND CHEMICAL CORPORATION

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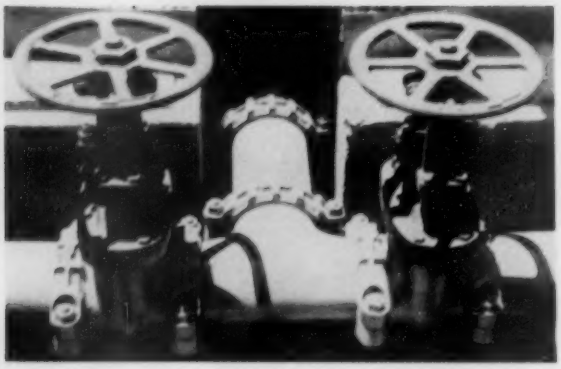

Valves Help Speed Pipe Installation

The new grooved-end valve is for use with grooved couplings. Designed for use with all types of standard grooved couplings, its extremely close tolerances assure a perfect fit of the coupling over the grooved end of the valve body. The resulting connection is rapidly installed and leakproof, yet flexible enough to allow deflections of several degrees in any direction. It is particularly useful where pipe must be laid on the ground over uneven terrain, in either temporary or permanent installations.

Petroleum companies are now using this new valve in pumping stations, drilling rigs, terminal manifolds, tank-battery hookups, cooling, and fire-protection systems. The flexibility of the grooved-end connection is especially advantageous in installations where the problem of expansion and contraction exists in piping systems.

The iron-body, bronze-mounted design reduces corrosion and consequent scoring of the stem and packing. Swing-down bolts and convenient shelves on the yoke permit the gland to be propped up, out of the way, during repacking. In addition, backseating surfaces permit the valve to be repacked while wide open and under pressure. Both rising and nonrising stem patterns are available. *Lunkenheimer Co.*

Check No. 6 On The Time-Saver Card

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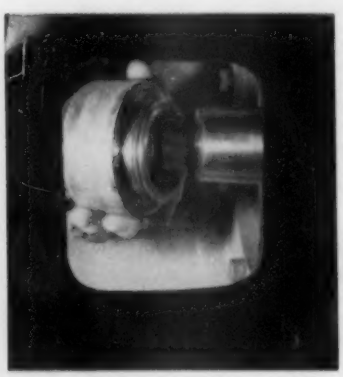


Mechanical Shaft Seal Reduces Maintenance

A new rotary mechanical shaft seal in an easily replaceable cartridge assembly has been designed especially for service in fluid-mixing applications. It is available in either single or double types, on all models of Lightnin mixers where shaft sealing is required, and in a variety of materials to suit any fluid-mixing conditions.

Positive, leakproof sealing of tank liquids, vapors, or gases is provided by the new seal. The seal never requires adjustment while in service. Field tests have shown that the seal can be expected to give years of trouble-free service under normal conditions.

The new seal is assembled in a cartridge as a single component. Anyone, using only a wrench, can easily uncouple and remove the assembly, and replace it in just a few minutes without dismantling the mixer or removing it from the tank, and without emptying the tank. Shaft alignment is automatic, and need not be checked. Through a locking-collar arrangement it is possible to replace the seal of a mixer that is entirely below the liquid level or on a pressure vessel, without loss of product or pressure.

The double-seal assembly is available in types suitable for pressures ranging up to 1,200 psig., and for temperatures ranging from —120° to +485° F. Materials include stainless steel, Stellite, bronze, ceramic, Hastelloy, and Teflon. *Mixing Equipment Co., Inc.*

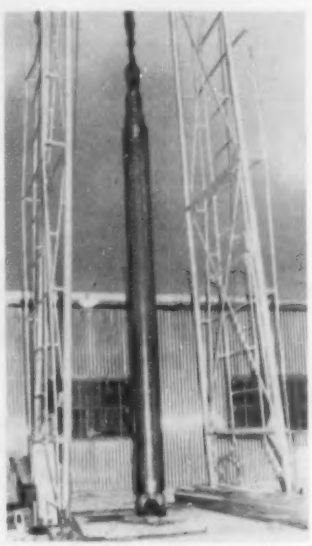
Check No. 7 On The Time-Saver Card

●

Rotary-Percussion Tool Increases Penetration Rate

A new rotary-percussion-type drilling tool has afforded a drilling rate of 15 ft. per hour (10⅝-in. hole) through granitic-type rock of 6.6 hardness. Tests have been conducted at the surface where drilling action can be observed. Experience of the oil industry indicates that surface penetration resistance through rock formations is approximately doubled at a depth of 6,000 ft.

This new tool develops a force of 54,000,000 lb. of thrust per minute. The tool uses electrical energy which completely divorces the percussion action of the tool from the mud system. This permits a supply of constant power



to the tool and at the same time permits unrestricted mud circulation. This system provides for efficient scavenging or flushing of the cuttings with resultant higher drilling speeds.

The new tool is slightly over 15 ft. in length and uses a standard rotary-type bit as well as other standard rotary equipment. The percussion tool is installed between the drill collar and bit. Electrical power is conducted through cable which extends through the axis of each drill-stem section. The cables and connectors are secured in the stem to permit makeup of the connectors automatically with the addition of each length of drill stem.

Hard-rock cuttings are reduced to about 200 mesh which assists materially

RETARDED ACID

Special acid treatment jumped production to 85 BOPH after regular acid achieved only 10 BOPH

A new well in a fast-reacting limestone formation flowed only 10 barrels of oil per hour after an ordinary acid treatment. Then a Retarded Acid treatment by Dowell jumped production to 85 BOPH, flowing.

Retarded Acid is designed to penetrate deep into the formation before it is spent. This action is made possible by an additive agent which retards the reaction of the acid with the formation.

Retarded Acid is primarily suited for use in limestone or dolomitic formations with either fractured or vugular porosity. Dowell engineers perform Retarded Acid treatments in the same way as conventional acidizing, using the latest treating techniques, modern tools and high pressure, high-volume pumping equipment.

For more information on Retarded Acid and the many other Dowell oil field services, contact your nearest Dowell station, or write to DOWELL INCORPORATED, Tulsa 1, Oklahoma, Dept. B 11.

services for the oil industry

DOWELL

A SERVICE SUBSIDIARY OF THE DOW CHEMICAL COMPANY

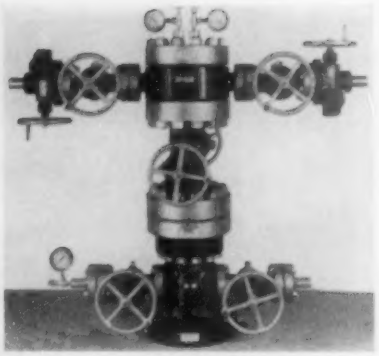
What's New... Use the handy Time-Saver Cards

in the scavenging process. It also appears that faulted formations may now be successfully penetrated, leaving a straight hole and with much less risk of tool failure. The tool has only two moving parts which afford a self-adjusting stroke in response to various formation densities, permitting more effective action through the formations encountered. *American Percussion Tool Co.*

Check No. 8 On The Time-Saver Card

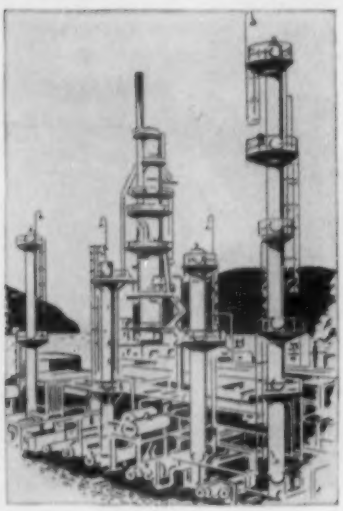
Christmas Tree Is Designed For Dual-Zone Completions

This dual christmas tree for use in dual-well completions provides a substantial saving in drilling and equipment costs. The dual assembly includes such new features as a special hanging and sealing flange on top of the tubing head and steel-to-steel seals throughout the assembly through the use of Flex-Float steel rings. Standard A.P.I. ring joints are also used as a seal from the atmosphere.



The dual tree provides full opening into both strings for swabbing, paraffin cutting, running pressure bombs, storm chokes, pumping, flowing, or for gas lifting. The two tubing strings are hung independently and may be run into the well or pulled from the well independently. With the use of packers, the casing may be loaded to prevent corrosion. It is possible with the dual tree to flow from three separate zones by using the two strings of tubing and the annulus, should a triple completion be indicated. *Oil Center Tool Co.*

Check No. 9 On The Time-Saver Card



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Quality-Controlled Chemicals for Better Refinery Products

The uniform and consistent quality of PENNSALT Chemicals is why so many oil refineries in the West prefer these reliable chemicals.

Dependability of consistent quality means greater refinery efficiency, increase in production and aids in reducing costs. This is why so many nationally known refineries have used PENNSALT Quality-Controlled chemicals for years.

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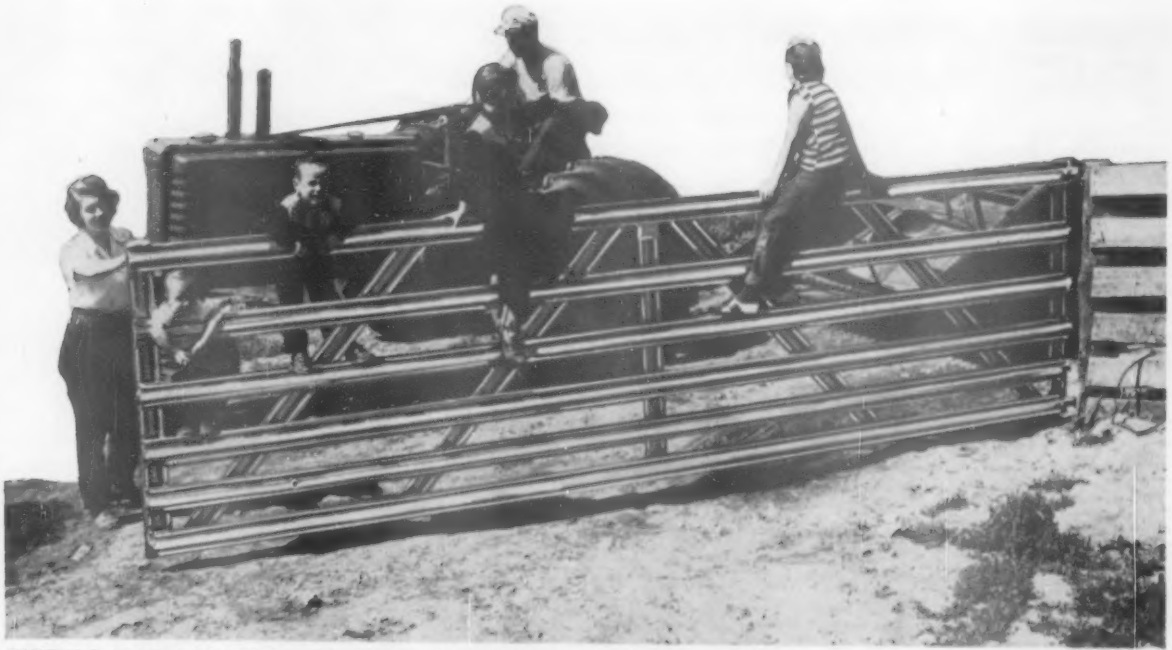
Pennsalt Chemicals

Two Traveling Blocks Made For Deep-Well Drilling

Built in 400 and 500-ton dead-load capacities, two new blocks meet the extra-duty requirements of today's deeper wells. Available with five or six sheaves, they can be specified with sheave diameters and grooving to match all heavy-duty mast and derrick-crown blocks.

The new, big traveling blocks retain all of the straight-fall characteristics



PICTURE THIS BEAUTIFUL 16 FOOT ALUMINUM "LIFE-TIME" GATE
ON YOUR FARM OR RANCH. SEE THEM AT YOUR LOCAL DEALER—

The owner of this FARM or RANCH was glad to sign the Easement when told that a shiny "Life-Time" Aluminum Gate would fill the gap. Ten factories in the U.S.A. and one in Canada. Main office: ALPRODCO, INC., Mineral Wells, Texas.

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NEW MODEL
Series 53
CURTIN
CENTRIFUGES

with
7 improvements

Aluminum castings reduce weight one-third to approximately 5-1/4 lbs. . . . Diameter of drive shaft increased from 7/16" to 1/2" for added strength . . . Gear train redesigned for more efficient operation . . . Both 15 cc and 100 cc sizes use the same crank . . . Spindle shaft ball bearing mounted, easier to turn . . . Drive shaft of corrosion resistant stainless steel . . . Spindle of corrosion resistant stainless steel.

Write for bulletin 53

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"the modern filter medium"

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OIL COMPANIES FOR:

- Filtration of Water for Repressure Pumping.
- Filtration of Sanitary and Cooling Water Supplies.
- Filtration of Spent Doctor and Process Wash Waters.
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ANTHRAFILT, being essentially a pure carbon is not affected by acid or alkaline solutions.

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Representing ANTHRACITE EQUIPMENT CORP.
Anthracite Institute Bldg., Wilkes-Barre, Pa.

What's New... Use the handy Time-Saver Cards

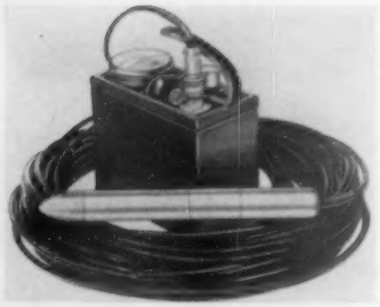
and design features of the Brewster traveling-block line. Sheaves are mounted on Timken tapered bearings assuring positive alignment and easy turning under heaviest loads. The high-capacity center pin is of heat-treated alloy steel and has been rifle-drilled to assure an abundant supply of lubricant to individual sheave bearings. Fully streamlined, the new blocks provide maximum safety for the derrick men. *Brewster Co., Inc.*

Check No. 10 On The Time-Saver Card

Geiger Counter Designed for Subsurface Exploration

The new DG-9 drill-hole Geiger counter is specially engineered to meet the needs of users who are primarily interested in reliability of performance and stability throughout subsurface uranium-exploration operations.

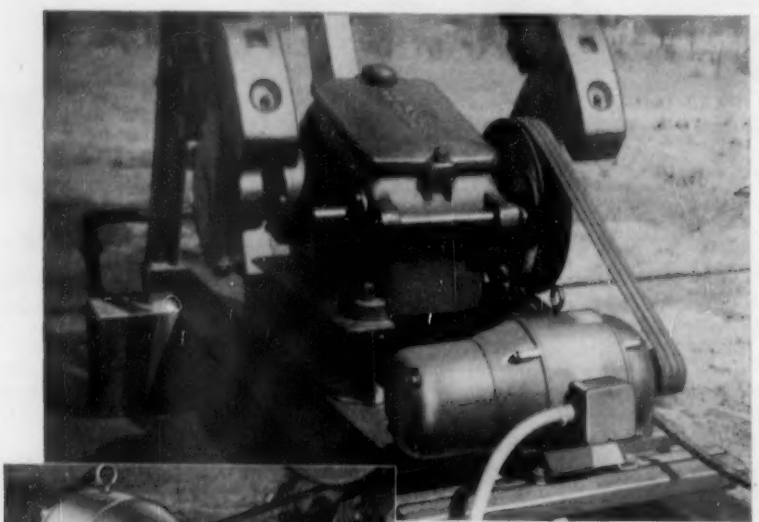
The DG-9 can be used for radioactive probing to a depth of 1,000 ft. Indication features include an easy-to-read sensitivity meter adjustable to zero,



earphones, and a flashing neon light. The circuit is completely tropicalized and offers 900 volts of power, using only standard-type batteries.

The detecting tube is housed in a waterproofed probe which is designed to safeguard the instrument against careless handling. The probe is weighted so that it will not float, and tapered so that it will not catch on obstructions. Rugged construction makes this counter particularly suitable for subterranean exploration. Standard models are equipped with a beta-gamma discriminating hand probe in addition to the deep-hole probe. *Radiac Co., Inc.*

Check No. 11 On The Time-Saver Card



R & M's new single-phase "All-Weather" motor—specially designed for oil field use—has a removable "hat" over condensers and centrifugal switch, enabling you to inspect these parts even while the motor is running.

This motor takes its "hat" off to you!

The removable cover on R & M single-phase "All-Weather" motors is the latest of many features that make Robbins & Myers Oil Country motors superior. Features like these pay off in profit for you: full-height end-heads that protect internal parts . . . exclusive "weatherizing" that defies the elements . . . "clean sweep" ventilation that keeps motor cool and clean . . . extra-large factory-sealed, pre-lubricated ball bearings . . . screened openings that keep out rodents and debris.

Even with all these features, R & M motors are sold at *standard motor prices.* They've built a wonderful reputation in the oil fields—they'll build a wonderful record for you. Single-phase motors, 1 to 7½ HP; open-protected polyphase, 1 to 125 HP. Write for bulletin OG on Oil Field Motors and the name of your nearest R & M representative.

R&M *"All-Weather"* *Oil Country* **MOTORS**

ROBBINS & MYERS, Inc.
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"All-Weather" is an R & M trademark

Roebling To Market New, Stronger Wire Ropes

Developments in wire manufacture and rope fabrication now permit Roebling to announce a new line of wire ropes, with steel cores, having 15 per cent greater strength than the strongest grade-marketed heretofore.

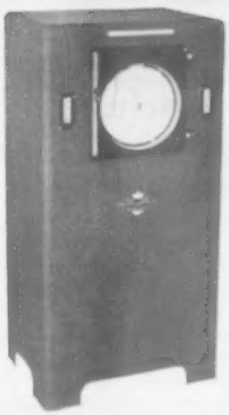
In the past, one of the obstacles to rope of higher strength was a proportionate decrease in other qualities as the strength went up. The new rope has higher resistance to wear from bending and abrasion. Laboratory tests as well as on-the-job observations, over several years, have proved these facts. Consequently, the new rope not only has higher strength, but will also deliver longer rope life.

The new rope will be manufactured primarily in preformed constructions. It will be of particular interest to operators of drilling and excavating equipment. It will allow the handling of heavier loads for longer periods, as well as the drilling of deeper wells.

The higher strength rope will be obtainable in rope sizes ranging from ¼ to 3½ in. Industries that will benefit will be those which use a wire rope with independent wirerope core, such as construction, drilling, and marine. The new ropes are for use on shovels, draglines, wagon scrapers, and the entire gamut of earth-moving equipment, rotary rigs, car arches, chokers, and dredges. *John A. Roebling's Sons Corp.*

Check No. 12 On The Time-Saver Card

AC-ME RECORDING GRAVITOMETER • AC-ME SPECIFIC GRAVITY BALANCE



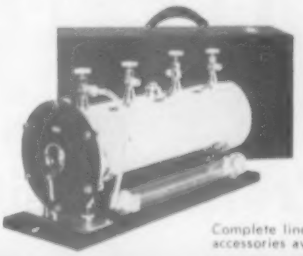
for accurate gas measurement.

- SENSITIVE
- CONTINUOUS RECORD
- AUTOMATICALLY COMPENSATED

This instrument has been designed for accuracy in determining specific gravity of gas—it contains no rotating parts that will wear out and operates on the principle of weighing a volume of gas in comparison with an equal volume of air.

ADOPTED BY THE NATURAL GASOLINE ASSOCIATION AS THE MEANS FOR DETERMINING THE SPECIFIC GRAVITY OF NATURAL GAS

Designed and constructed to meet the specifications required for determining the specific gravity of gas under the various conditions found in both field and laboratory.



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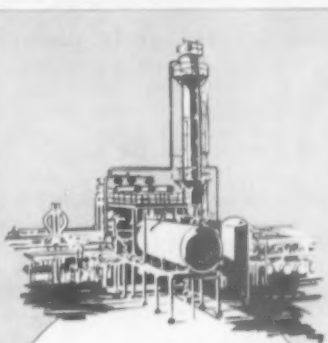

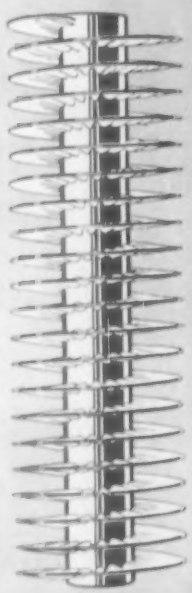

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An organic inhibitor, "RODINE" No. 203 does not contain sulphur or arsenic; ingredients known to stimulate embrittlement.

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Sodium Nitrite for Corrosion Prevention. Detailed information on the use of sodium nitrite as an inexpensive and efficient rust and corrosion inhibitor is presented in a new booklet. The booklet covers the use of the product alone to protect metal surfaces, primarily iron and steel, or combinations of sodium nitrite with such materials as caustic soda or phosphates for dual-purpose applications. *Solvay Process Division, Allied Chemical & Dye Corp.*

Check No. 13 On The Time-Saver Card

●

Weatherford Catalog. A new 42-page catalog, with color illustrations, completely describes the Weatherford line. Complete with engineering data, it contains the recommended procedure for the use of scratchers, centralizers, float shoes, float collars, guide shoes, baffle collars, Hi-column cement heads, drill-pipe wipers, ease-on plugs, drill-pipe and casing protectors, and barrel-rolled pull-back springs. Emphasis is placed on the Weatherford technique of well protection from channeling through the use of its various types of centralizers and scratchers. *Weatherford Oil Tool Co., Inc.*

Check No. 14 On The Time-Saver Card

●

Metalweld Rubber Linings Bulletin. An illustrated, two-color, eight-page bulletin describes the advantages and application of rubber lining to steel tanks, drums, pipes, valves, fittings, and pumps. Included in the bulletin are important tables giving the resistance characteristics of rubber lining to inorganic acids, salts, and alkalies, organic materials, and a wide group of miscellaneous materials. Details on the chemical, abrasive, and temperature-resistant qualities of rubber linings, and the different types of linings available are also given. *Protective Coatings Division, Metalweld Inc.*

Check No. 15 On The Time-Saver Card

●

Graloc Fittings, a new 12-page, 2-color combination engineering manual and catalog completely describes the new

Graloc line of universal pipe connections, unions, and bleeder valves. Describing a new concept of all-steel sealing with a pressure-aided seat, the book shows how this principle has been incorporated into a pipe connection and union covering connection ranges from ½ to 12 in. and vent-drain bleeder. Complete descriptions are given of applications which simplify and improve piping systems. In addition, the book gives complete data on construction, operation, advantages, specifications, dimensions, pressure ratings, and prices. *Gray Tool Co.*

Check No. 16 On The Time-Saver Card

●

Controlled Injection of Odorant in Natural Gas Lines. Data Sheet E-54-7 describes an automatic control system used on natural gas pipelines to inject odorants into varying natural gas flow. A controlled-volume pump is used as a final control element to accurately inject optimum amounts of odorant. *Milton Roy Co.*

Check No. 17 On The Time-Saver Card

●

New Automatic Loading Rack Flash Tester. Bulletin No. 720 describes an instrument licensed by Standard Oil Co. of Indiana. The eight-page, illustrated bulletin points up the safety and time-saving features of the apparatus when used as a means of checking distillate fuel at any bulk-distributing or storage point. *Precision Scientific Co.*

Check No. 18 On The Time-Saver Card

●

Mobile Generator Sets. This 16-page, 2-color brochure includes plans, elevations, and end views in line drawings of generator sets, mounted on skids, trailers, and railroad cars. Data tables set forth engine type, kilowatt output, brake-horsepower output, and speed. Each type is described, and cutaway illustrations spotlight mechanical features. *English Electric Co., Ltd.*

Check No. 19 On The Time-Saver Card

●

Vertical Versatility is the key-product descriptive phrase in a new 16-page bulletin which describes and illustrates the application of vertical industrial service pumps for liquid transfer from short settings in both industrial and process services. These pumps are being offered in three basic production designs: the standard service type and the heavy-duty service type, both of which may be applied to the pumping of clear water and alkaline liquids and the special-service type for pumping hydrocarbons, volatile liquids, chemical solu-

Fyr-Fyter's
NEW PRESSURIZED
5-POUND
DRY CHEMICAL
EXTINGUISHER

Sprays a
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STREAM

Just point it at the fire . . . and press your thumb! Instantly, Fyr-Fyter's new specially designed nozzle spreads the fire-killing chemical powder in a flat, dense, 10 to 12 foot long, and 60° wide angle stream. This thick, blanket-like stream lays a flat pattern of powder level with the base of the fire. It covers a greater area, provides better heat-shielding for the operator and faster flame smothering action!

It's a rugged, lightweight, all-brass extinguisher that's *always ready for action!* A unique, leak-proof valve positively holds air or nitrogen pressure charge . . . visual gage constantly shows pressure condition. Simplified design and construction makes it easy to inspect, clean and recharge. Except after use, recharging is never necessary . . . only periodic visual inspection is required. A service station air chuck can be used for pressurizing.

For instant, more positive protection against Class B and C fire hazards . . . all flammable liquids, gases and electrical fires . . . use an Underwriters' Laboratories Approved Fyr-Fyter Pressurized Dry Chemical Extinguisher! 10, 20 and 30 lb. models are also available.

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Rubber covered pulley gives long wear, positive engagement.
Reduction gear eliminates jack shaft. V-belt drive and guard.
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tions, and other process liquids. Design details and materials of construction of each of the three types varies to meet the specific conditions to which these pumps are applied. For example, the heavy-duty service-type pump is especially designed and constructed for cooling-tower basin service. Generally, pumps in this line provide capacities from 30 to 40,000 g.p.m., a head range up to 1,000 ft. and a horsepower range with electric motors up to 2,500 hp. with right-angle gear drives up to 400 hp., and with steam turbines as required. *Peerless Pump Division, Food Machinery & Chemical Corp.*

Check No. 20 On The Time-Saver Card

●

Vertical Separators. A new, 24-page Catalog 30-01 describes equipment designed to separate free gas and solution gas from the crude-oil stream at the well head. In addition to perspective, cutaway, and dimensional drawings for low, intermediate, and high-pressure sizes, the new catalog features a section, "Sizing BS&B Vertical Separators." This section consists of a series of graphs which give the gas capacity of each separator through its operating-pressure range. The graphs compensate for oil gravities of 35°, 45°, 55°, and 65° A.P.I. and cover a gas-specific gravity range of 0.6 to 0.9. *Black, Sivalls & Bryson, Inc.*

Check No. 21 On The Time-Saver Card

●

Ideal Type 130 Consolidated Drilling Rig. The new, 20-page Bulletin No. 434 includes improvements developed since this 1,300 hp., deep-drilling rig was introduced several years ago. It gives more complete information, especially on Gyrol fluid drives and additional centralized controls, including the optional Micromatic drilling control which provides precision performance automatically. *National Supply Co.*

Check No. 22 On The Time-Saver Card

●

Production History of the Principal Oil-Producing Formations in Arkansas, Louisiana, Mississippi, New Mexico, and Texas. This 52-page study, prepared by Second National's oil and gas department, will be of great value to anyone interested in petroleum production. Information from the A.I.M.E. publication, "Statistics of Oil and Gas Development and Production through 1952," plus additional facts from the Texas Railroad Commission, have been combined and rearranged in this publication. Production history is given for 18 principal oil-producing formations in the five-state area. Statistics include: the name of the field; county; year of discovery; area-proved acres; production to end of 1952; wells producing December 1952; gravity, A.P.I.; character of formation; porosity per cent; and average net-production thickness in feet. *Second National Bank of Houston.*

Check No. 23 On The Time-Saver Card

●

The Power Behind the Pump. Dependable and automatic pumping for oilfield applications is the topic of a booklet, Form No. D504. This new, eight-page brochure contains pictures of pumping engines in Ohio, Kansas, Texas, and California. Statements and performance records by owners who have found profit with their pumping engines are also included. *Caterpillar Tractor Co.*

Check No. 24 On The Time-Saver Card

●

New Engineering Paper on Filter Facts. This 12-page paper is the first one of a series based on factual engineering data concerning filter facts. Comprehensive details concerning filtering equipment and its relation to the following subjects are covered: the lubrication system; contaminants and the damage they do; filter materials; limitations of

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Aluminum body for aircraft and general use, stainless steel for chemical, food, and dairy industries. Angle, 2, 3, 4-way, with or without drain, flanged for panel mounting.

Write for Bulletin No. 754. Distributors in principal cities from coast to coast.

CHECK RELIEF PLUG GLOBE NEEDLE

132

RM REPUBLIC MANUFACTURING CO.
15655 BROOKPARK ROAD • CLEVELAND 11, OHIO

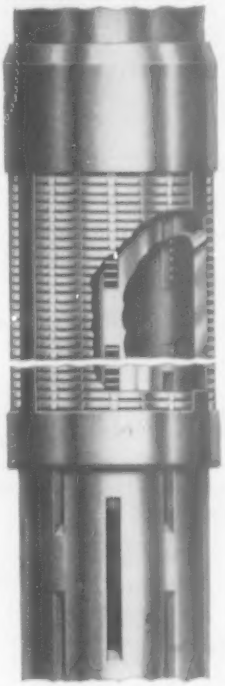
Screen Pipe

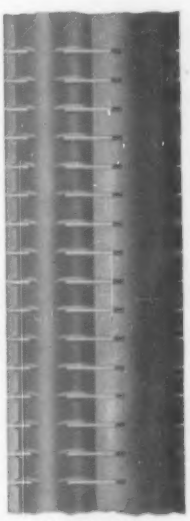
FOR ANY REQUIREMENT..

Emsco products are backed by long experience in well screening problems. Years of successful use and scientific testing in U. S. and foreign fields have proved their superiority.

Emsco Wire Wrapped Screen with Vertical Slots provides 50% to 60% more opening per foot than conventional drilled holes. It retains 25% more tensile strength than drilled pipe.

WIRE WRAPPED





SLOTTED

Emsco Slotted Screen Pipe retains 80% to 85% of the original collapsing strength of the pipe. It may be rotated or spudded reasonably without risk of damage. Its smooth surface facilitates setting and pulling . . . prolongs its life. Slots are milled from the inside and sawed from the outside, "V" shaped for maximum drainage and minimum clogging, ⅛" straight wall connects outside opening to beginning of "V" on inside. Slots are so arranged that strips of solid steel run full length of pipe. A few feet of screen provides drainage area equal to full capacity of the pipe.

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ON BADGER PIPELINE sections recently completed, Contracting and Material Co. of Evanston, Ill. reported their Cleveland "240" stayed well ahead of the pipe gang even where they encountered tough digging like that shown. Get further information on the "240" for your 1955 trenching requirements from *your Cleveland Distributor* or from *The Cleveland Trencher Co., 20100 St. Clair Ave., Cleveland 17, Ohio.*

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for switch yards, substations, transmission towers, buildings, etc.

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for buildings, plants, bridges and other heavy construction.

PLATE STEEL
for petroleum processing and chemical plant equipment, LP Gas and anhydrous ammonia tanks.

WAREHOUSE STEEL
for rolled bars, plates, structural shapes, and all other warehouse items.

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FLINT STEEL

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chemical filters; filter construction; modern filter in relation to detergent oils; filter in relation to engine fuel; and conditions affecting size of filter and type of installation. *Engine Life Products Corp.*

Check No. 25 On The Time-Saver Card

●

Technical Charts. A new 12-page catalog outlines services in producing recording charts for standard and special instruments. It includes samples of both dial and roll-type charts. The method of production of over 8,000 different standard charts is outlined. Technical information is given on requirements for special charts. *Technical Charts, Inc.*

Check No. 26 On The Time-Saver Card

●

International Trail Magazine. Ohio Oil Co. and the results it is obtaining in oil fields of southern Illinois with help of secondary-recovery methods by water-flood, provide the subject matter for a story in the January issue. The story, written by John P. Hogan, staff writer for the magazine, was based upon an on-the-spot inspection of oil operations at Findlay, Ohio; Indianapolis; and Robinson, Ill. Another illustrated article of interest in this issue is one describing Halliburton Oil Well Cementing Co.'s technical center. *International Harvestor Co.*

Check No. 27 On The Time-Saver Card

●

Handbook on Demineralizing. This 40-page handbook compares various methods of water treatment, as well as indicating the comparison between demineralizers and evaporators. It goes into the characteristics of the various types of available cation and anion exchange materials and offers data on operating costs of demineralizing. It tells when to use two-bed, three-bed, and four-bed, mixed on mono-bed demineralizers. It also indicates when decarbonator or vacuum deaerators are required. *Cochrane Corp.*

Check No. 28 On The Time-Saver Card

●

Type S Extension Hanger for Permanent Completions, a multicolor data sheet, printed on card stock describes the Type S extension hangers for both permanent completions and for selective landing nipples. Cutaway illustrations serve to show the construction of each piece of equipment, and tables itemize all engineering information. *Otis Pressure Control, Inc.*

Check No. 29 On The Time-Saver Card

EQUIPMENT MEN . . . in the News

Hughes Tool Awards Service Pins to Seventeen

M. E. Montrose, vice president, sales, recently awarded service pins to 17 Hughes Tool Co. employes, representing a total oil-patch experience of more than 170 years. The presentation was made at Midland, Tex. Back row, left to right: Pete Connor, 20; Don Garrett, 5; Kenneth Lord, 5; R. T. McDaniel, 5; C. B. Fagans, 5; S. T. Crews, 5; Burney Stovall, 10; Charles Bumgardner, 5; Carl Townsend, 5; Robert McCurry, 5. Front row: J. R. Kunkel, 10; G. A. Berglan, 10; R. E. Kimsey, 25; Maxine Mason, 5; M. E. Montrose; A. H. Linne, 10; Jack Steadman, 5; H. W. Benton, 5. Not present to receive their service pins were J. B. Fanning, 10; Gus Henley, 10; W. J. Highberger, 5; and Pete Bailey, 5.

Fluid Packed Pump Co. Promotes Sales Executives

Sidney Shuman, executive vice president of Fluid Packed Pump Co., has announced the promotions of the following sales executives.

Glen W. Peters, veteran salesman, who has served the company in various capacities since 1941, has been appointed assistant vice president and acting manager of the Southwest division.

D. H. Vandenberg, formerly manager of the Southwest division, has been promoted to manager of product sales for Fluid Packed Pump.

Peters will direct the sales activities in the Southwest division and assist management in administering merchandising policies in assuming the responsibilities of his new assignment.

G. W. PETERS

VANDENBURG

Vandenberg started with the company in 1940 at Los Nietos, Calif., in the manufacturing department, transferring to the sales department in 1953. He was named manager of the Southwest division at Fort Worth, Tex., in 1954.

R. E. Kimsey, manager western region, Hughes Tool Co. receiving 25-year service pin and congratulations from M. E. Montrose, vice president, sales, during a recent meeting at Midland.

Homco Opens New Sales Office At Enid, Okla.

Houston Oil Field Material Co., Inc., has announced the opening of a new sales office at Enid. H. D. Robinson, former store manager at Sullivan City, Tex., has been transferred to Enid as resident manager for the new location.

The Enid office will operate in conjunction with the Tulsa office of Homco. This office has been open for 10 years with Morris Hart as resident manager. The Enid office will allow Homco to give better service to its customers in the Oklahoma area.

Ethyl to Build Testing Laboratory In Houston

Plans for building a gasoline testing laboratory in Houston to provide immediate service for refiners in that fast-growing oil center, have been announced by Ethyl Corp. The new structure is scheduled to be completed this year.

Ethyl, manufacturer of antiknock compounds to improve the octane rating of gasoline, presently operates five gasoline testing laboratories throughout the United States. These are located in Yonkers, N. Y.; Baton Rouge, La.; Tulsa; Kansas City; and San Francisco, Calif.

Each year these laboratories test more than 15,000 samples of gasoline from refineries, service stations, and other sources to determine the motor and research octane numbers, gum content, distillation, and other properties. The test results provide oil companies, whenever desired, with an accurate quality check on their gasolines. Overall Ethyl test data are compiled on both a national and a regional basis for regular distribution to refiners.

Elliott Made President of J. & L. Supply Division

R. ELLIOTT

Rainey Elliott has been named president of Supply Division of Jones & Laughlin Steel Corp., C. L. Austin, president of J&L has announced. Elliott was named general manager of the Supply Division in December 1952. He had been vice president and director of J&L Supply prior to its incorporation into J&L as a division on that date.

Elliott joined the Supply Division organization in 1935 as a store manager in Electra, Tex. Subsequently he was a salesman in Turnertown and Dallas, Tex., and in 1941 was named sales manager.

In January 1952, Elliott was named director of sales and in August of that year was elected vice president and director of the supply company.

The Supply Division serves the oil country with 88 stores throughout the western and southwestern parts of the United States. It operates from head-

quarters at Tulsa. Through J&L Steel Sales Co., Ltd., a Canadian subsidiary of J&L, the Supply Division serves the oil country in Canada.

Schlumberger Announces Seven Personnel Changes

W. W. GOODE

Schlumberger Well Surveying Corp. has announced a number of personnel transfers and promotions in both the field and headquarters operations staffs. W. W. Goode, former assistant area manager for the Mid-Continent area at Tulsa, has been appointed Permian basin division manager at Midland, Tex.

G. J. DECKER

HARRY TRUE

He replaces George J. Decker, who has been transferred to the office of South Louisiana division manager at Gretna, La.

D. W. COWART

J. A. MULLINAX

Harry True has been transferred from Gretna to Tulsa to serve as assistant area manager. In the Southeast area, P. P. Favier has been named assistant to the area manager at New Orleans, replacing A. H. Curran, who has been transferred to Canadian operations as manager of the western Canada division.

D. W. Cowart has been named technical assistant to the vice president, operations department, in the Houston headquarters organizaion. Cowart comes to Houston from Edmonton, Alta., where he was manager of the western Canada division.

J. A. Mullinax has been appointed assistant to the sales manager in Houston and will work on the corporation's advertising program. Before coming to Houston, Mullinax was location manager at Farmington, N. M.

Demco Holds Sales Meeting In Oklahoma City

"The biggest year yet" was the outlook expressed by the personnel and sales representatives of Drilling Equipment Manufacturing Co. who attended a sales meeting held recently in Oklahoma City. Shown at the meeting are, standing: L. W. Mauck, sales representative, Kansas; Roy Wilkerson, sales manager; W. B. Hickman, district manager, Rocky Mountains and Canada; Terrell Jordan, sales manager, Crenshaw Sales Co., Gulf Coast distributors; and N. J. Barnard, plant superintendent. Seated are: A. S. Herron, sales representative, Crenshaw Sales, southern Louisiana; B. H. Phillips, traffic manager, Oklahoma City office; J. G. Allen, sales representative, Oklahoma; R. C. Forrest, sales representative, Texas Panhandle; L. H. Matherne, sales representative, Crenshaw Sales, southern Louisiana; C. G. Fager, sales representative, North Texas; C. L. Knight, general manager; P. R. Snetcher, president; M. T. Harrell, sales representative, East Texas, northern Louisiana, Arkansas, and Mississippi; Russell Vaught, sales representative, Oklahoma; G. N. Osborn, sales representative, Canada; A. C. Baldwin, office manager, Oklahoma City office; H. W. Denton, sales representative, West Texas and New Mexico; and L. T. Waltimire, sales representative, California.

Bethlehem Announces Promotions in Texas

Bethlehem Supply Co. has recently announced several personnel changes in its North Central Texas district.

J. P. Chance, city salesman at Wichita Falls, Tex., has been promoted to store manager. He succeeds H. E. Williams, who became chief clerk to W. E. Stephenson, district manager at Wichita Falls.

L. T. Little, machinery serviceman at Wichita Falls, has been transferred to Abilene, Tex., and promoted to field salesman. D. A. Hutson, pump-shop operator at Abilene, has been advanced to the position of field salesman at the same point.

B. J. O'Dell, formerly chief clerk, has been named assistant store manager at Whitesboro, Tex. R. E. Ligon, chief clerk at San Angelo, Tex., has been promoted to field salesman and transferred to the Whitesboro store. Ligon will make his home at Sherman, Tex., in order to more efficiently serve the drilling activity in the Sherman area.

De Laval Names Bixby As Division Sales Manager

D. T. Bixby has been appointed sales manager of the standard products division with headquarters in Trenton, N. J., it has been announced by De Laval Steam Turbine Co., Trenton. Prior to his new post, Bixby served as sales manager of De Laval's Seattle district office, and since joining the company in 1945 as sales engineer, he has served in the Trenton and San Francisco sales offices.

Globe Steel Stockholders Approve B. & W. Purchase

Alfred Iddles, president of Babcock & Wilcox Co. has announced that stockholders of Globe Steel Tubes Co., Milwaukee, have approved purchase of its assets and business by Babcock & Wilcox who took possession of the plant on January 3.

At the same time it has been announced that the plant would become a part of the company's Tubular Products Division which has headquarters in Beaver Falls, Pa., under Edward A.

What's behind Mission products in the field?

Nothing but the finest will ever bear the name of

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MANUFACTURING CO.
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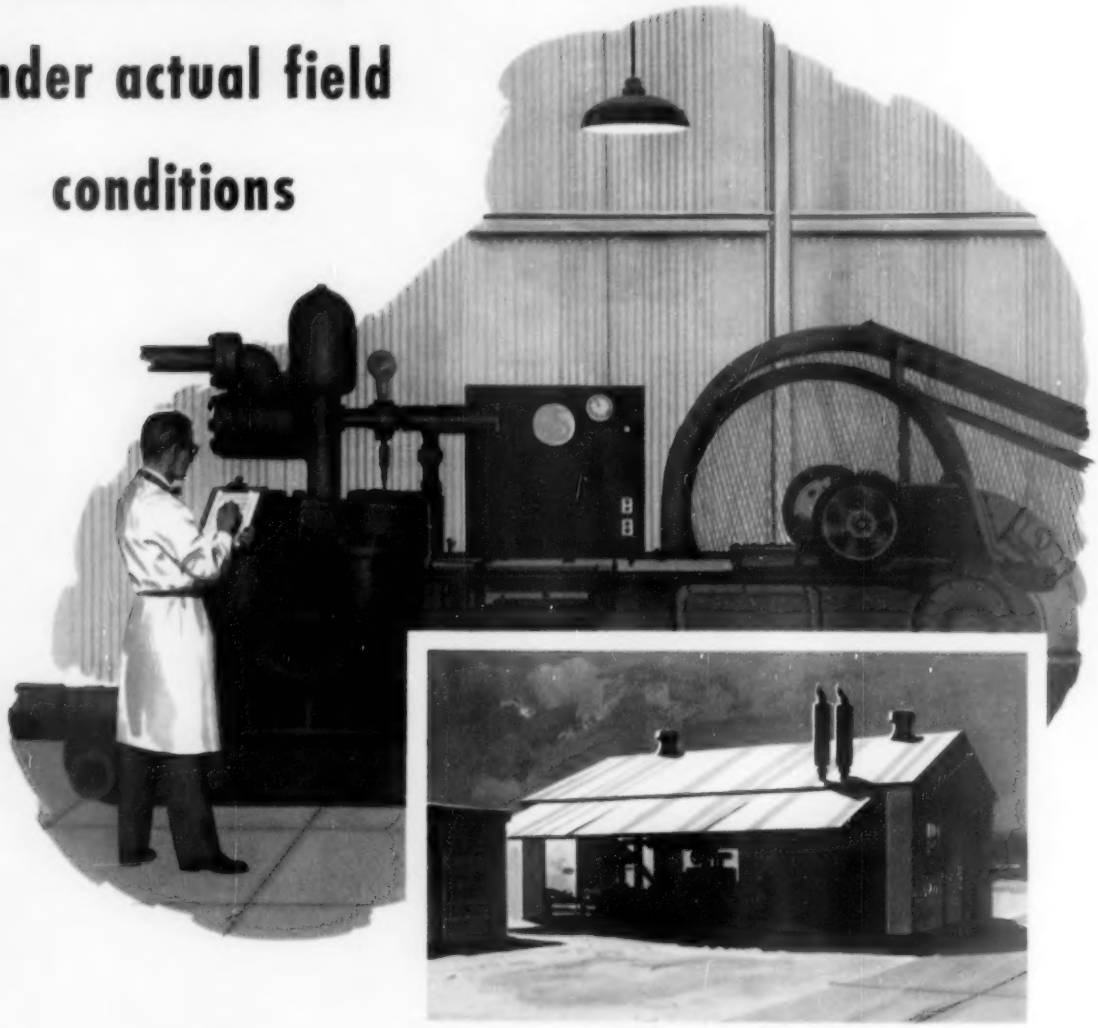
Export Office: 80 Rockefeller Plaza, New York

Products tested under actual field conditions



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A test pump simulating actual field conditions operates 24 hours a day on automatic controls at the Mission plant in Houston testing fluid end slush pump parts to assure their dependable performance in the field. This test set-up, housed in a special building, includes a 7½ x 14 standard oil field pump powered by a 450 HP gas engine and has a standard size mud pit using old mud taken from field pits containing cuttings and high sand content. The unit operates at temperatures up to 140° and at pressures in excess of 1500 pounds with all parts being subjected to severe operating conditions during each test.

This thorough and continuing program of testing Mission parts is your assurance that "nothing but the finest will ever bear the name of Mission." Specify Mission fluid end slush pump parts for high quality and dependable performance. Available through all supply stores.

Livingstone, vice president. Glen H. Rearick, formerly in charge of the Alliance, Ohio, plant of Tubular Products Division, has been placed in charge of the Milwaukee plant.

Iddles also announced that W. C. Buchanan, formerly president of Globe, had consented to remain with B. & W. in an advisory capacity and had been elected a vice president consultant by the board of directors of B. & W.

Sherrard Shifted from Olney to Casper

R. M. SHERRARD

Appointment of Robert M. Sherrard as district representative at Casper, Wyo., for U. S. Steel Corp.'s Oil Well Supply Division has been announced by R. L. Armstrong, manager of Oilwell's Rocky Mountain area. Sherrard goes to his new post from Olney, Ill., where he has served as district merchandise manager since 1951. He joined Oilwell in 1937 at Casper. The following year he transferred to Illinois and served in various sales and managerial posts at Salem, Clay City, and Mattoon, Ill., prior to becoming district merchandise manager.

Marion Power Shovel Opens Sales, Service Department

Establishment of a consolidated sales and service department for the entire line of Marion-Osgood-General equipment in both the domestic and export markets has been announced by Marion Power Shovel Co.

D. E. Rizor has been named to head the coordinated program as vice president for sales and service. Kenneth E. Williamson, Marion - Osgood - General sales manager, small machines, is concentrating his activities in the sale of equipment in sizes of 4 cu. yd. and under, through a distributor organization throughout the United States and Canada. Richard M. Bessom, as export sales manager, is in charge of sales of the complete line of machines through a worldwide organization of distributors abroad.

Coordination of sales and service of the entire line of Marion-Osgood-General excavating equipment, power shovels, and cranes is designed to provide greater convenience to customers in the purchase of both new machines and replacement parts, it was pointed out by John P. Courtright, president.

Beryllium Corp. Opens New Houston Office

Beryllium Corp., Reading, Pa., has announced the opening of a sales office at Houston with Ross E. Schofield as district representative in charge. From this office Schofield will provide sales engineering services to users of the company's beryllium alloys in Texas and Louisiana.

With the establishment of direct sales representation in Houston by Beryllium, nearby service on an important group of materials is available to this market. The new Houston office will in no way conflict with the present distribution of the company's beryllium-copper safety tools which have long been in demand by the petroleum and chemical industries. Safety tools will continue to be marketed through Beryllium's established network of distributors in the area.

Dowell Opens New General Sales Office at Dallas

C. R. OLSON

Dowell Incorporated, oil-well and industrial servicing company, has opened offices in the Fidelity Union Life Building in Dallas, according to an announcement by A. C. Polk, vice president and general manager, Tulsa. C. R. (Clancy) Olson, sales engineer, has been transferred to the new office from the company's office in Oklahoma City.

The Dallas office was opened to provide better technical information on Dowell services and strengthen the sales position of the company in the Dallas area. The Dallas office is the fourth general sales office opened by Dowell. Others are located in New York, Fort Worth, and Houston. Dowell operates from more than 160 sales and service locations in 31 states, 5 Canadian provinces, and in Venezuela.

Olson joined Dowell at El Reno, Okla., in 1947 as service engineer, being promoted to sales engineer in 1949. He has served the company in Oklahoma City since 1951.

Philadelphia Pump Becomes American Meter Subsidiary

Philadelphia Pump & Machinery Co., Inc. has announced that, as of December 1, 1954, it has become a subsidiary of American Meter Co.

Joseph A. Eagan remains president of the company. Vice president is Wm. G. Hamilton, Jr., and secretary and treasurer is William Ashby.

The principal office of the company is located in Philadelphia.

Continental Announces Sales Department Changes

R. G. SEIM

The following personnel changes have been announced by Continental Supply Co.

R. G. Seim has been appointed assistant district manager of Continental's Illinois-Indiana - Kentucky district. He will work under the supervision of District Manager C. H. Fischer, with headquarters in Evansville, Ind.

Frank Hord, Corpus Christi, Tex., field salesman, was moved to city salesman in Houston, and B. G. Patterson was named field salesman at the Corpus Christi store. C. B. Herring, Corpus Christi field salesman, took over duties as store manager at Victoria, Tex.

Freddie Vincent, Houma, La., store manager, was transferred to New Orleans as sales representative, and Frank E. Ellis was moved from New Iberia, La., to Houma as store manager. Morris S. Holleman replaced Ellis as New Iberia store manager.

R. R. Schramm, former bookkeeper at Williston, N. D., was named field salesman at Artesia, Colo. William H. Long, Jr., was appointed city salesman at Oklahoma City, and John D. Craddock, salesman in Tyler, Tex.

Seim joined Continental at Duncan, Okla., in 1948 as a credit-department trainee. He was then assigned to Tulsa as a credit representative for the Kansas-Oklahoma division, and since 1950 has been in Casper, Wyo., in charge of credit work in the Rocky Mountain district.

Ethyl Corp. Builds Plant at Sarnia, Canada

E. L. Shea, president of Ethyl Corp. has recently announced plans to build at Sarnia, Ont., Canada, a plant to manufacture Ethyl antiknock compounds. The plant will be owned and operated by Ethyl Corp. of Canada, Ltd., a subsidiary of Ethyl Corp.

The new plant, which will be the first to manufacture antiknock compounds in Canada, will be used to supply the growing needs for these products by Canadian oil refineries.

At present, Ethyl fluid is imported from the United States where Ethyl has

manufacturing plants at Baton Rouge, La., and near Houston.

Merger Effected Between Instrument Manufacturers

According to an announcement by R. L. Leadbetter, president of Burgess-Manning Co., a merger between Burgess-Manning Co., Libertyville, Ill., and Penn Industrial Instrument Corp., Philadelphia, became effective January 31. Under the new merger, the Penn business, consisting of the manufacture of industrial instruments, including a full line of flow meters, continues as a division of Burgess-Manning.

Burgess-Manning, which maintains divisional offices in Chicago and Dallas, in addition to its Libertyville office, will carry on its present activities, which include the manufacture of industrial silencing equipment and architectural acoustical products.

The Burgess-Manning shareholders elected William C. Bennett and William Melas, the former principal executive officers of Penn, as directors of the merged company. The former officers of Penn will continue in direct charge of the Industrial Instrument Division.

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Accurate long-distance transmission of specific gravity recordings is no longer a problem with the new Arcco-Anubis Metameter Recording and Transmitting Liquid Gravitometer. This instrument combines the mechanism of the standard Arcco Liquid Gravitometer with a meta-meter telemeter transmission system which records and transmits the specific gravity record to control room or other remote location. The interconnecting line may be any two-wire electrical circuit or its equivalent: private wires, telephone circuits, carrier current channels, or radio (VHF or UHF).
The range of the standard instrument is .15 or larger, but instruments with ranges of .10 or .05 can be supplied. Specific gravity charts are available for many gravity ranges, and special degree A.P.I. charts can be furnished at slight additional cost. Request Bulletin No. 111-R2B for complete details.
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Robinson Joins McEvoy Sales Staff In Texas

Gil M. Robinson has been added to the sales force of McEvoy Co. to give increased sales coverage in the Central Texas area. He will make his headquarters in Abilene, Tex.

Robinson previously represented McEvoy as agent. He has served the oil companies in Central and West Texas for a number of years, and is fully experienced in all phases of the industry. He recently completed a 2-week training period in McEvoy's Houston plant.

Wolverine Tube Names Fritz As Representative

R. M. FRITZ

Robert M. Fritz has been appointed sales representative, C. T. Fuller, southwestern district sales manager for Wolverine Tube, division of Calumet & Hecla, Inc., has announced recently.

Formerly chemical-sales and service engineer with Subcom Co., Fritz will contact petrochemical processors and refiners in Oklahoma and North Texas. He will headquarter in Wolverine Tube's Tulsa office.

Dunham Tank Names Cox New Manager in Tulsa

Walter H. Cox has been appointed manager of Dunham Tank Co.'s new Tulsa office. This announcement was made by Sam A. Wilson, general manager of Dunham Tank, Minden, La., a division of Anderson Dunham, Inc., Baton Rouge, La. Wilson stated that the appointment was in line with Dunham's expansion program which includes the opening of offices, yards, and warehouses at strategic points in the Mid-Continent area.

Cox has an extensive background of oil-field experience. He was associated with Oil Well Supply Co. for 6 years. Later he became affiliated with Conner Tank Co., Casper, Wyo., in the capacity of sales manager. For the past few years, Cox has been with Union Tank Co. at Houston, Wichita, Kan., and Tulsa.

Dunham Tank manufactures welded

MAJOR PIPE LINE OPERATED BY LOW-COST PURCHASED

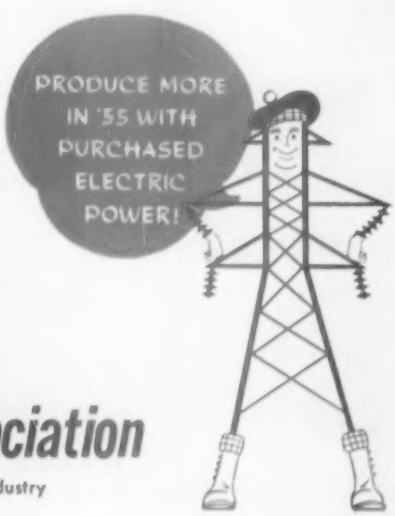
Electric Power

Pictured here is one of four modern stations on a major electric-powered pipe line boasting a total of 22,000 horsepower, and a 24-hour capacity of 340,000 barrels.

Clean as a kitchen, this modern, compact station houses five electric pumps totaling 5,550 horsepower — and the entire plant may be operated by remote control, if desired!

Purchased Electric Power does the job easier — with less attention; maintenance costs are lower; all-over operating expenses are kept to a minimum.

Let Purchased Electric Power go to work for you, too! There's a Power Engineer at your nearest Electric Power Company who will be glad to show you how LOW COST POWER fits into your picture!



for more facts, or address your request to P. O. Box 2771, Dallas, Texas

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and bolted tanks, emulsion treaters, separators, and cold-separation units.

Sted Appointed Executive By American Steel & Wire

The appointment of Norman M. Sted as assistant general manager of sales, has been announced by John Graham, American Steel & Wire Division's general manager of sales. In his new capacity, Sted will assist Graham in handling all general sales activities of the division.

Twenty-nine years ago, Sted joined the division in the order department. He held several different posts before being transferred to the sales department as a clerk in 1934. He served successively as a price clerk, assistant chief clerk, and chief clerk before being named office manager in 1939. He was assistant to Cleveland district manager of sales from 1943 to 1945, when he was promoted to assistant manager of manufacturers product sales division of the general sales department. Sted was appointed manager of manufacturers products sales in 1949 and in 1953 was named to head the Cleveland district sales organization as manager.

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Lube oil failure and overheated cooling water can lead to BIG troubles *unless you spot them quickly*. That's just what a Penn Engine Safety Control does. At the first sign of such troubles, this control automatically flashes a warning light, sounds an alarm bell, or stops the engine — whichever you choose. Then, the fault can be investigated and corrected before engine damage develops. This low cost insurance for expensive equipment can be easily installed on present engines, and is available from your manufacturer on new models. Ask your engine supplier or write **Penn Controls, Inc., Goshen, Indiana.**

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F. H. Dunn Joins Frank Wheatley Supply Co.

F. H. DUNN

Frank H. Dunn, Jr., has joined Frank Wheatley Supply Co. as assistant to the manager. He replaces John R. Fitzpatrick, who will be devoting full time to sales engineering in the field. Dunn was formerly associated with Deep Rock Oil Corp. as assistant to the superintendent in the pipeline department.

General Controls Expands Facilities in Glendale

According to an announcement by W. A. Ray, president of General Controls Co., producers of automatic temperature, pressure and flow controls, construction has begun on two additional facilities at the company's plant in Glendale, Calif.

Ray stated that these additional facilities will represent another step in the company's continued expansion. The current expansion project consists of adding to both the engineering and administrative facilities.

A 15,000-sq. ft. addition is being added to the present engineering area and will be used for both tooling and engineering, particularly in research and development phases. A second story is being added to the main administrative building, increasing the office area by one third.

Oilwell Supply Announces Three Texas Appointments

Three appointments in the West Texas district of U. S. Steel's Oil Well Supply Division have been announced recently by William Miskimins, manager of Oilwell's Central Midwest area.

Winifred Berl Potts, storeman in the Big Spring, Tex., store, has been promoted to field representative at that city. Richard E. Yates, field representative at Odessa, Tex., has been named manager of the Sundown, Tex., store, and Joe Lloyd Ward, storeman at Odessa, has been promoted to field representative at that location.

Potts joined Oilwell at the Big Spring store in 1952. Yates, who joined Oilwell in 1948, served at Anson and Wichita Falls, Tex., and after service in the U. S. Navy, returned to the organization in 1951 at Odessa, where he became field representative in 1953. Ward has been located at the Odessa store since 1952.

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Quality Oil Field Lubricants Available in LA. · MISS. · TEX. · N.M. · N.D. · WYO.

NEW!

"Varec" 5070 INTERNAL SAFETY VALVE

A quick closing emergency shut-off valve designed to automatically cut off flow out of tank in case of fire. Valve is spring-loaded and is held in open position by a fusible link which melts at 160°F. When this link melts, spring action completely closes the valve.

New features include:

1. VALVE CAGE WITH BOTTOM PORTION CLOSED TO MINIMIZE AGITATION OF SEDIMENT ON FLOOR OF TANK.
2. VACUUM BREAKER INCORPORATED IN PALLET FOR EASE OF OPENING.
3. OPERATING LEVER LINKAGE ARRANGED FOR POSITIVE MANUAL SHUT-OFF.
4. VALVE SEAT FACED WITH STAINLESS STEEL TO RESIST CORROSION.

Standard construction is steel body with bronze valve disc. May be mounted on standard A.P.I. or VAREC Fig. No. 308 Series Tank Shell Nozzles. Available with Series 15 or Series 30 Flanges. Available sizes: 4" x 6", 6" x 8", 8" x 10", 10" x 12" and 12" x 14".

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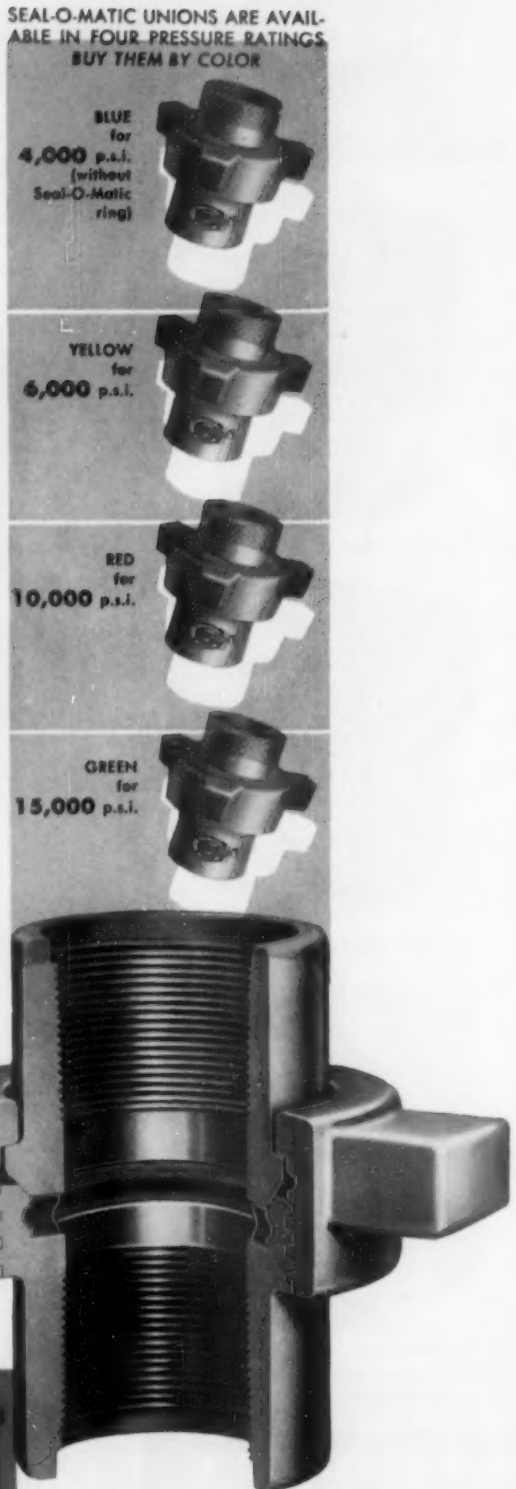
High in strength because they are high in quality, Guiberson Seal-O-Matic Unions are rugged, heavy duty couplings that stand up to the severest tests.

Double-sealing Seal-O-Matic Ring and metal to metal seat hold working pressures securely. Seal-O-Matic Ring is molded from special oil resistant compound that will not deteriorate in oil, gas or under pressure. All metal parts are made of high tensile alloy steel, accurately machined to assure interchangeability.

Quick and easy to make or break, Seal-O-Matic Unions are ideal for a multitude of uses ...with minimum upkeep and positive, leak-proof seal.

SEAL-O-MATIC UNIONS ARE AVAILABLE IN FOUR PRESSURE RATINGS BUY THEM BY COLOR



Regular Unions have line pipe thread. Also available in EUE 8 round thread.

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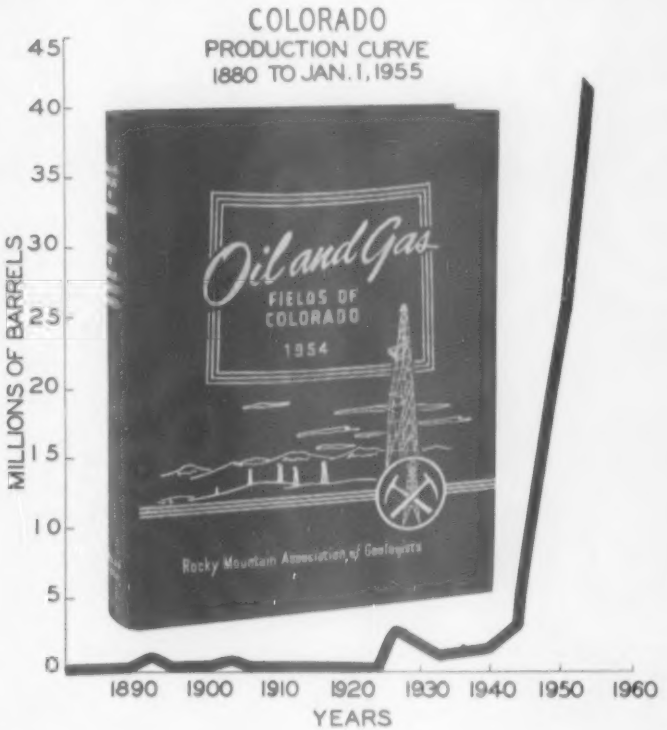
EXPLORATION

Colorado Holds A Glowing Promise for The Years Ahead

by Frank J. Gardner



IF you read the comics, you know that friend Pogo is refereeing an "out-thinkin' contest." Just what is being "thunk out" is in doubt, but the contestants are expected to come up with "some solid thoughts that bruise the mind."

In the oil-finding game, outthinking the other fellow is good exploratory thinking. And the solid thoughts that result are to the advantage of all, if they are freely exchanged.

Solid thoughts . . . Colorado geologists have done just this. They have freely exchanged their solid thoughts and compiled them into one important book. Sponsored by the Rocky Mountain Association of Geologists, the book catalogs the thinking evolved from 93 years of oil exploration in the mountain state. It's titled simply—"The Oil and Gas Fields of Colorado."

The big thing about the book is not its mind-bruising qualities, but the material it provides for future "out-thinkin'" contests. It doesn't tell you where the next oil field will be, but it surely provides some glaring examples of exploratory neglect during those 93 years of oil history. And the state production curve shown here (adapted from the book) reveals in spectacular fashion what can happen when the thinkers start to think.

And lessons to learn . . . In 1862, less than 3 years after Colonel Drake found the first commercial oil field, Colorado provided the second. The discovery was drilled on Oil Creek, 6 miles north of Canon City. It was 50 ft. deep. But it started a play that led to a 1,300-well development, and at least one of those wells is still producing. "After all these years," says R. R. Munoz in dedicating the new book, "this field still has lessons to teach; for example, fractured shale reservoirs such as occur here are taking on particular importance in exploration and exploitation thinking today, and much remains to be learned about them. . . . Exploration geologists have been inclined to think too little of the past and too much of the future. . . . It is well to remember that our past experiences will exercise much more control over our approach to tomorrow's exploration problems."

Actually, 1953 and 1954 awakened Colorado to the oil future that lay before it. The spiraling production that began at Rangely field in 1943 gave the state the largest oil field in the Rockies, but not until the advent of Denver-Julesburg did the state consider oil as a major commodity. In the words of F. A. Thurman, Denver consultant, ". . . Oil production in Colorado is a venerable, if not revered, industry, having long been regarded as that business least likely to succeed."

Today, however, the picture has changed. In 1954, about one-half of all Rocky Mountain drilling activity centered in Colorado. Oil production during the year shot up to 42 million barrels, valued at $120,000,000. Natural gas, 34,000,000,000 cu. ft. of it, added another $2,000,000 to state income. The state government is enjoying a rich harvest of oil and gas royalties and rentals, and some 2½ million acres of school lands are under lease.

Will find more fields . . . But this campaign has only begun. Like most of the Rocky Mountain states, Colorado teems with prospects for the oil hunter. Briefly, these can be divided into three main groups: (1) the buried structures in the untested reaches of the Denver-Julesburg basin, (2) the frontal overthrust belt along the eastern edge of the Rockies, and (3) the multitude of untested surface and subsurface structures that lie in all parts of the western half of the state.

Exploratory pressure is being applied to every corner of Colorado. The northeast, of course, is in the heat of the Denver-Julesburg play. The southeast is feeling the effects of the Hugoton embayment expansion and the new interest in the Raton basin. Strikes in the Paradox basin and the swift growth of the San Juan gas fields have sparked new exploration over all the southwest corner, and in the northwest, the need for gas to supply the new pipelines to the west will stimulate drilling in the Green River and Uinta basins.

It was time for this book. It is a starting point for another series of "out-thinkin'" contests in the expanded search for Colorado oil and gas.

Here's why and how they're . . .

Using Refraction Work in South Florida

by E. A. Blomerth, Jr.

- High-velocity carbonate and evaporite sediments in the South Florida embayment made it almost impossible to map deeper formations with reflection methods.
- So refraction techniques—the "old-fashioned way"—were tried. And they succeeded. They led to the discovery of Forty Mile Bend field in Dade County.
- This article describes these successful refraction techniques and tells how seismic crews solved the unusual problems involved in shooting over South Florida.

BECAUSE of its many carbonate and evaporite sediments, the South Florida embayment is unique in Gulf Coast geology. The other embayments and basins are composed almost entirely of clastics, although there are a few carbonates and evaporites present. Practically the entire area of South Florida fails to provide satisfactory and consistent reflection records for the mapping of the deeper, or Lower Cretaceous, markers. As a result, many of the crews now working in South Florida have turned to refraction methods in preference to reflection work.

Exploration has been very active in Florida for some time. More than 950 wells have been drilled in the state since 1900, nearly a quarter of these since 1947. Until very recently, most of the activity was centered in North Florida and in the Florida Panhandle, or Apalachicola Embayment.

Since 1951, however, there has been a big increase in activity in the South Florida embayment. This includes that portion of the mainland on the southern flank of the Ocala uplift dropping off generally in a south-southwesterly direction into the Gulf of Mexico.

Sedimentation in the South Florida embayment has been estimated geophysically to be more than 30,000 ft. These sediments are composed almost wholly of carbonates and evaporites to the depth of present exploratory drilling.

The reflection techniques used in South Florida usually consist of springboarding the reflection energy from a mass array of pattern holes and recording it through a complex system of overlapping multiple detectors. Some companies have been known to use between 700 and 800 detectors on spreads of less than a quarter mile long. This naturally takes a lot of time and keeps mileage covered at a bare minimum. The data so received usually cannot be carried continuously. They require sharp correlation across many poor data areas.

This is in sharp contrast to the fast, simple, and efficient methods that can be used to get refraction data. These data are considered reliable and can usually be carried continuously over large areas of southern Florida. So many of the companies have chosen this method of attacking the difficult area.

Author is with Mene Grande Oil Co., Apartado 709, Caracas, Venezuela. Paper originally presented before the eighth annual midwestern meeting of the Society of Exploration Geophysicists, November 18-19, 1954, Dallas.

Topography . . . The elevation of most of southern Florida is extremely low. Very few parts of it reach 100 ft. above sea level, and much of it lies very near or below sea level. As a result, large areas are marsh and swamp and much is completely under water.

During the dry season, which runs from the latter part of November through the early part of July, all but the very lowest places become dry, sandy plains. The rest of the time South Florida is drenched almost daily with torrential tropical rains. These flood almost 80 per cent of the land, and often submerge even the main highways. Most of the swamps are veritable jungles of cypress, practically impassable to anything other than portable equipment.

There are very few roads in South Florida due to lack of development and the high cost of building them across such topography.

Refraction Procedures and Problems

Recording . . . The current recording procedures of the Gulf crew involve the use of two complete recording units, two surveying crews, three drill tours, and from three to four shooters. Thus there are practically two crews operating as one system. This requires intensive coordinating measures, but for the double investment of men and equipment it is maintained that production has been upped to five times that of a normal size crew.

Recording procedure is fairly simple, though the weather conditions and topography often make it rather rough on the recording crews. The linemen walk all spreads and carry light, portable lines. When a spread is fully laid out it covers 5,100 ft. The cables carry eighteen traces, 300 ft. apart. The energy is received through only one detector per trace, During the rainy season it is very rare to find a spread laid out that isn't partially or completely under water. Only through constant attention by the head linemen and operators can a cable be made to last more than 5 or 6 months.

Surveying, mapping, and permits . . . Surveying on any refraction crew is a full time job. But for a fast-moving dual unit, the work is vastly multiplied. This is particularly true in South Florida. There are very few proven and established corners to be found anywhere. The sections are irregular and, in the bad marsh and swamp areas, they have never been surveyed.

The long shot-to-detector distances used require many shot points to fall on lands other than those under lease by the operating company. Along the coast these distances demand the surveying and shooting of offshore waters.

Drilling . . . The problems facing the driller in South Florida are unique and extremely puzzling. A shallow coral limestone reef lies near the surface over most of the southern peninsula. It outcrops in many places, but in others it runs to a depth of 20 or 30 ft. covered by an overburden of sand and shell.

In the areas where this reef is very thin or missing altogether, a light drilling rig will do an excellent job of shothole drilling. In the other areas the light rig quickly drills down to the rock, then slowly grinds away—if it can cut it at all.

While the drill is rotating, the pumps are washing away a huge cavity in the sand above the rock. This continues until the rock is cut through. But by then the water stream below the limestone is hit, and the hole immediately goes blind. And it drains all the water from the cavity above, which quickly caves in. If the caving carries near the surface, the drill is in dire danger of falling into the hole. This has been known to happen several times in past years.

Equipment and transportation . . . The equipment used in nearly all types of cross-country exploration in South Florida must be four-wheel-drive equipped. There are some exceptions to this where a unit can pick its way through or around the bad areas. But generally, where a profile must be followed, all four wheels must be able to pull the load.

Large areas are completely inaccessible to any type of truck-mounted drill. To combat this, experiments are now being made with a drill mounted on a wide-cleated, high-clearance tractor. Where four-wheel-drive drills can be used, however, they are assisted by corresponding four-wheel-drive water trucks.

In some areas where no drilling equipment can be moved, surface shots can sometimes be used if enough muck and water are present. The near-surface limestone prohibits any jetting whatsoever.

At full strength, the dual Gulf crew shows a personnel list of 32 men and 20 automotive units. The number of four-wheel-drive units requires a full-time mechanic at work in a well-equipped shop to keep all equipment in operating condition at all times.

Communications . . . Radio communication is extremely important. Six 30-watt FM transmitters and receivers are now being used. In the early stages of operations, this presented the greatest problem. During certain months of the year, communication was nearly impossible because of extremely bad atmospheric interference. Attempts to overcome this began by using the usual whip antenna. Then this was replaced by a large skirted, resonant-wave antenna. Finally a horizontal dipole was tried. Each change was an improvement, but still the recorders would have to shut down because of communications.

After considerable experimentation, the problem was solved by elevating the dipoles 30 to 35 ft. above the ground. Since doing this there have been very few communications difficulties.

Velocities . . . When the crew arrived in South Florida in 1952, velocity information was very scant. There were only a few vertical-velocity surveys within the South Florida embayment, and many of these did not give information to the depths that were desired. And they were usually poor in quality.

Fortunately, there have been several wildcat tests completed since that time that have given closer velocity control. These surveys are far superior to those previously run due to the many improvements made in methods and equipment used in the recording procedures.

In general, these surveys show very few radical velocity changes. Drilling cores show little other than anhydrites, limestones, and dolomites, and their presence might very likely account for the poor continuous-reflection information that is received.

Certain anhydrite and dolomite sections near the Cedar Keys limestone offer enough velocity contrasts to give fair to good reflections. In places where such contrast is absent, there is very little to change the direction of the energy propagated.

It should be noted here that sound propagation in this medium is terrific. Reflection crews rarely use powder. Numerous caps and seismograph boosters loaded in the pattern holes furnish more than enough energy for the multiple-detector spreads. In refraction, we've learned that 50 lb. of powder is often more than enough to record a refraction event on single detectors some 50,000 to 55,000 ft. away from the energy source. Vertical-velocity surveys show that the vertical velocities change rather fast down to about 3,000 ft. After that the velocities increase slowly in relation to the depth of burial.

Interpretation

After all field problems have been met and records laid before the interpreter, the most critical part of the operation is begun. Upon the method of interpretation selected and its success depends the success of the whole costly operation. In slightly over 2 years of shooting, the Gulf crew has shot more than 1,000 miles of two-way control profiling. This work has covered major parts of four large counties and sections of others.

This has created a staggering job for the interpreter. The records are unlike any seen elsewhere. While one would expect higher frequencies from the unusually high-velocity section, optimum recording frequencies have been found to be very low and considerable phase distortion exists on many of the records in some areas. But the general character of an event at a given distance is fairly consistent over a large area.

We have tried to map a shallow and a deep horizon, and we believe we've succeeded. A minimum grid of 3 miles has been used wherever possible. And the ties between the intersecting profiles are excellent to an accuracy of ±0.002 second on both horizons in areas where the records are fair to good.

The deeper arrival is thought to be refracting from a bed near the top of the Sunniland limestone. Enough ties have been established with existing dry holes to justify this interpretation. While exploratory drilling has not been too active in recent months, the few tests that have been completed on or near current work have further verified it.

Until very recently, only one area of production had been found in the entire state. This was Sunniland field, owned and operated by Humble Oil & Refining Co. It was discovered by core-drill methods.

Now, however, other production has been found in the Forty-Mile Bend area of Dade County by Gulf Oil Corp. and Commonwealth Oil Co. This discovery was based on the refraction method of shooting. Exploratory drilling is now in progress to determine the extent of the new find.

Acknowledgments

Appreciation is expressed to J. E. McGee, E. A. Malone, and L. V. Martin for their assistance and helpful suggestions while this paper was being written, and to Gulf Oil Corp. for the permission to publish it.

Exploration Highlights

MID-CONTINENT

OKLAHOMA

North Offset to East Maysville Field Completed

Stanolind brought in its 1 Carpenter in Garvin County. The well is located SE NW SE 14-4n-2w. Completion was in the Bromide at a plugged back total depth of 6,020 ft. with the top of pay at 5,907 ft. The well flowed 117 bbl. of 40°-gravity oil 3 hours through an 18/64-in. choke with an estimated 24-hour potential of 936 bbl. per day.

The well was drilled in East Mays-

ville field as a north offset to Stanolind 1 Pitchlynn. The latter well was the wildcat discovery well in East Maysville field, where Stanolind holds 1,300 acres.

McLish Oil Recovered At Madill Field Try

Free oil has been recovered on drill-stem test of the McLish at Buffalo Oil Co.'s 1 Olmstead, NE SW NE 16-5s-5e, North Madill field expansion try in Marshall County.

The drill-stem test was run at 5,965-6,037 ft. Recovery was 5,600 ft. of 40°-gravity oil. Minor faulting may exist between this strike and the field discovery well, Sinclair et al 1 Griffin, based on the drill-stem test data evaluation. The 1 Olmstead is structurally high.

Meanwhile, Sinclair has proved a third Bromide sand at 1 Little in SE NW SE 15-5s-5e. This well is an outpost to North Madill field. Top of the sand was found at 6,258 ft. Recovery on a 2-hour drill-stem test at 6,286-6,318 ft. was 4,550 ft. 36.5°-gravity oil. The McLish was found at 6,311 ft. This is 163 ft. low to the 1 Griffin in SE NE NE 16. The 1 Little is going on down below 6,380 ft.

Gas Well Completed In East Lona Gas Area of Haskell

Superior Oil Co. has completed a wildcat gas discovery 2 miles east of East Lona gas area in Haskell County.

The 1 Gordon, NW NW SE 16-8n-20e, in the McAlester basin, was finaled in the basal Atoka at 5,567-82 ft. and in the Cromwell at 5,955-69 ft. for a flow of 4,735 M.c.f. of gas per day on ¾-in. choke natural. The same company is moving in to drill the 1 Drain, 1 mile south, in NW NW SE 21-8n-20e.

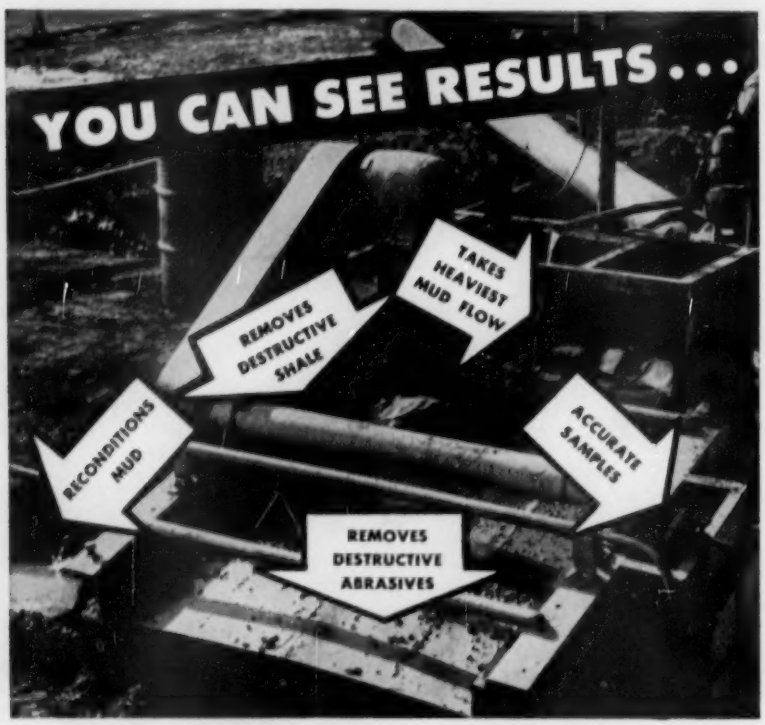
Arrow points to Atoka gas extension in Haskell County's East Lona area.

Bartlesville Sand Flows Oil at Grant County Well

First Bartlesville sand-basal Pennsylvanian oil production is reported for the Southeast Eureka pool in Grant County on the northern basin shelf of northern Oklahoma. This discovery moves production from that sand the farthest west in Oklahoma. Closest production from the Bartlesville is on the Nemaha granite ridge to the east.

The discovery, Viersen & Cochran 1

First Bartlesville sand production for the area west of the Nemaha Ridge is reported at Southeast Eureka pool in Grant County.



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Burghardt, NW NW SW 7-28n-8w, flowed 4,070 M.c.f. of gas per day and 5-10 bbl. of oil per hour on drill-stem test at 4,905-53 ft. Another test at 4,909-26 ft. flowed 80 bbl. of oil in 14 hours on 18/64-in. choke. Electric log tops at the well are: Layton 4,297-4,390 ft.; Oswego 4,406 ft.; Bartlesville or basal Penn sand 4,904-26 ft.; and Mississippian 4,944 ft.

Gas-Condensate Flows At Yellowstone Extender

Gas-condensate flowed at Rickhill Oil Co. 1 May, SE NE NE 21-29n-17w, to bring success to a Yellowstone field extension operation in Woods County.

The Arbuckle hit flowed 5,800 M.c.f. of gas per day on ⅜-in. choke with an estimated 28 bbl. of condensate per million ft. of gas. Perforations were at 5,984-6,040 ft. with 38 ft. of pay zone exposed.

Third Producer Added to Maysville Townsite Pool

Josaline Production Co. 1 Maysville townsite, C NE SE 16-4n-2w, was completed for a natural flow of 25 bbl. of oil per hour on 18/64-in. choke from perforations in the Bromide sand at 6,512-28 ft. This well is an extension on the northwest side of Garvin County's Maysville field in southern Oklahoma. To the northeast of town there is a well seeking production at Sinclair 1 Rogers.

Maysville townsite has three oil wells. The wells are the northwest extension of Maysville field.

HUGOTON EMBAYMENT

OKLAHOMA PANHANDLE

Beaver's Mocane Area Is Exploratory Focal Point

The center of wildcat and development in the Oklahoma Panhandle has made a definite shift to Beaver County. The focal point of this Beaver work is the Mocane area in 24eCM.

The newest hot wildcat is Cabot Carbon Co. and Oklahoma Natural Gas Co. 1 Hodges, SW NE 1-5n-24eCM. This is a multipay prospect 2 miles northwest of the town of Mocane. Gas and oil were recovered on drill-stem tests in both the lower Kansas City and Checkerboard lime of Pennsylvanian age.

This latest discovery in the county is 4 miles southeast of Lion Oil Co. 1 Hodges in SW NE 21-6n-24eCM. That well indicated Permian gas production 2 weeks ago. Successful completion of the Permian prospect would move gas production from that age 30 miles east of Hugoton field. The well flowed 392 M.c.f. per day from the Council Grove group of the Wolfcamp.

Mocane field . . . Carter Oil Co. 1 State-Ricards, SE SE NW 16-5n-25eCM, 1 mile southeast of Chester production, indicated production last week to become the third producer for the area. It is 2 miles east of Morrow production.

Southeast of the Mocane area in SE SE NW 12-4n-24eCM, Cities Service Oil Co. 1 Miles "B" has an indicated Marmaton discovery on basis of drill-stem tests. The well is 5 miles north-

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east of Beaver town and 1½ miles south of Sinclair 1 Maple, discovery of the 1-well Southwest Mocame field.

Southeast Mocane area . . . The Texas Co. has drilled the first dry hole in this field. The firm's 1-B Barby, NE SW 35-5n-25eCM, 1 mile west of production, hit bottom at 7,110 ft.

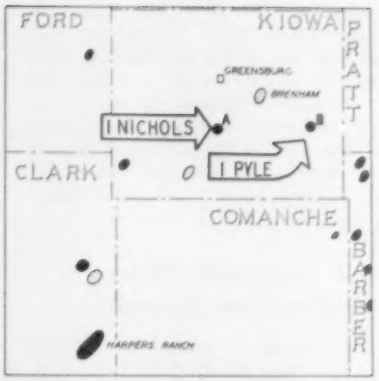
SOUTHWEST KANSAS

Kiowa County Area Puts Second New Pool on Record

Falcon Seaboard Drilling Co. and Gulf Oil Corp. 1 Nichols, NE NE NW 20-29s-18w, 5 miles south of the town of Greensburg, Kans., flowed 12,500 M.c.f. of gas per day on drill-stem test of the Mississippian at 4,960-75 ft. This is the second new pool in the area in the past 3 weeks.

Two weeks ago the same team opened a new oil pool at 1 Pyle, NE NE NE 16-29s-16w, 6 miles southeast of Haviland, Kans., and 9 miles southeast of Brenham field (see map). This well pumped oil at the rate of 304 bbl. per day from perforations in the Mississippian at 4,664-76 ft.

More wildcats will be drilled on the 10,000-acre block in Kiowa County.



Falcon Seaboard Drilling Co.-Gulf Oil Corp. 1 Nichols (A on map) is second successful wildcat on 10,000-acre block. The 1 Pyle (B on map) was a recent Mississippian oil discovery.

They will be in 27s-16w, 28s-16w, 28s-17w, 30s-17w, 28s-19w, 29s-18w, and 29s-19w.

TEXAS PANHANDLE

Missouri Lime Gas Strike Hinted at Hansford Well

Twin Morrow field in northeastern Hansford County has a prospective Missouri lime gas discovery in the mill at Producers Chemical Service 1 Steele, Section 57, Block 45, H&TC Survey, 8 miles northeast of Spearman, Tex.

The well gaged 2,190 M.c.f. of gas per day on a drill-stem test at 5,171-92 ft. The hinted discovery is located 1½ miles southeast of Fulton-Colorado 1 Steele, Tonkawa producer.

WEST TEXAS-NEW MEXICO

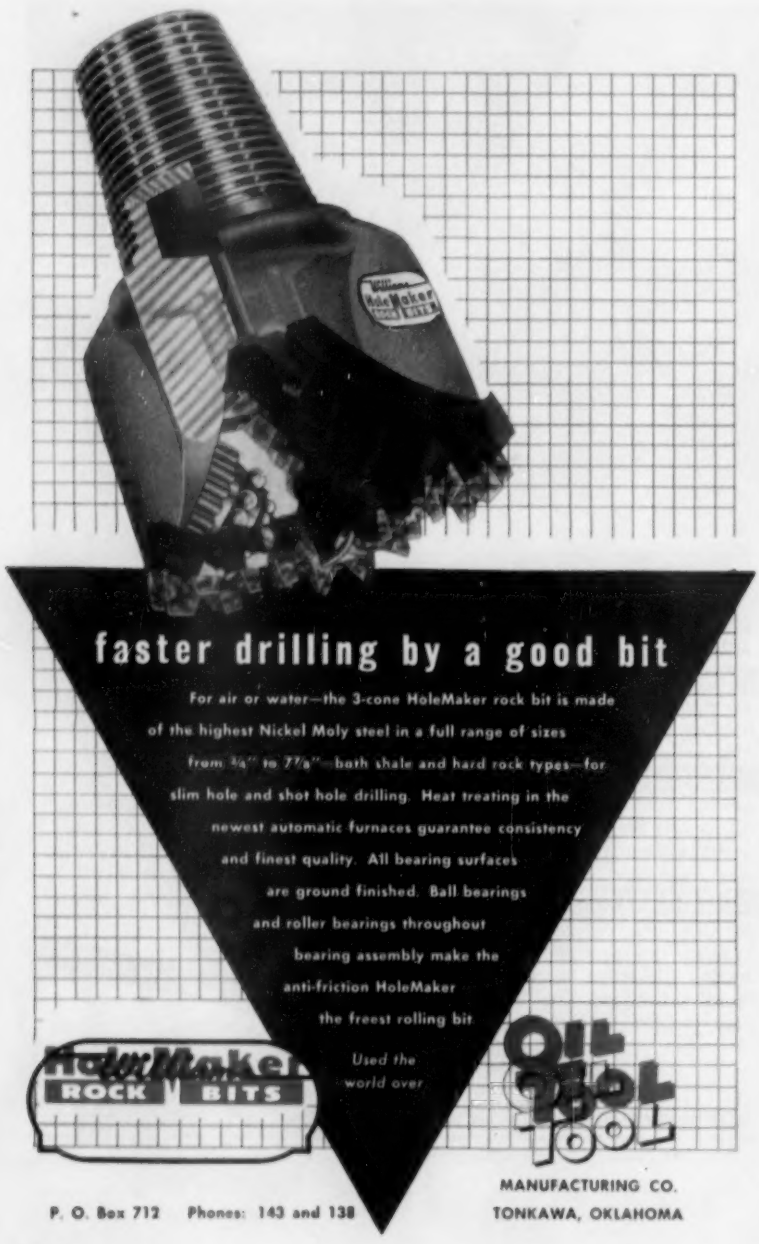
WEST TEXAS

Tom Green County Has First Ellenburger Oil

Completion had not been made at this writing, but from good results of a drill-stem test, and favorable electric logs, Tom Green County was in line for an Ellenburger producer. The prospect is L. L. Lookabaugh, Jr., Dallas, 1 John Y. Rust Estate, Section 963, San Saba County School Land Survey.

Drill-stem test at 6,603-17 ft. had gas in 15 minutes but did not flow oil. The well unloaded while coming out with drill pipe, and recovery was 1,730 ft. of clean, 43° oil, plus 160 ft. of heavily oil and gas-cut mud. There was no water. Flowing pressure reached 790 psi., and shut-in pressure was 2,500 psi. Total depth was 6,617 ft. Pipe was run to bottom for completion attempt.

Top of the Ellenburger was 6,603 ft.,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Tom Green County wildcat, northwest of San Angelo, has promised to give the county its first Ellenburger oil.

minus 4,458 ft. The well ran high on the Palo Pinto to nearby tests, and recovered gas, gas-cut mud and salt water on a drill-stem test of that formation. Tom Green County had Ellenburger oil at American Republics Corp. Walling discovery, in 1951, but it has since been depleted.

Lookabaugh is an independent operator from Dallas. Contributing acreage came from Bridewell Oil Co., Perkins-Protho Co., Sun Oil Co., and J. F. Hood, of San Angelo. Phillips Petroleum Co. contributed dry hole money.

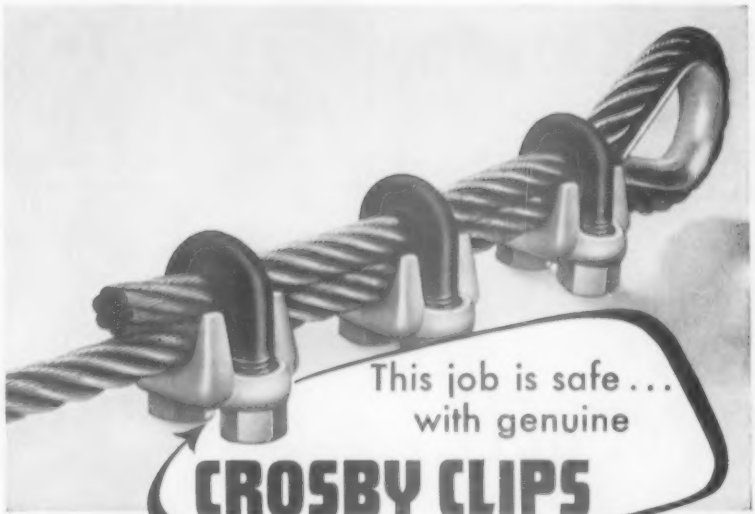
Dora Roberts - Ellenburger pool . . . This area, in western Midland County, had Pennsylvanian pay established at Forest and Cities Service 2-B-1 Roberts, Section 42. Location is ½-mile south of the field's Ellenburger discovery. Completion was dual. Pennsylvanian potential was 1,391 bbl. daily through 1-in. choke, from 10,108-28 ft.; gas-oil ratio 1,045:1. Ellenburger potential was 3,558 bbl. per day, same size choke, from 12,854-13,035 ft. Nearest Pennsylvanian oil is in Virey field. There are 3 other Ellenburger wells in the field.

SOUTHEAST NEW MEXICO

New Issue of Producing Formation Map, in Color

The 1955 issue of Executives' Producing Formation Map is now available. It covers the West Texas-Southeast New Mexico portion of the Permian basin. A colorful and informative map, and the only undertaking of its kind, published by Southwest Mapping Co., Continental Life Building, Fort Worth. Size 36 by 44 inches, 5½ miles to 1 inch scale.

All fields on the map are in color,



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classified as to formations from which they produce. Data is up to January 1, 1955.

In color-coding this area, the Permian system has been broken down into 11 groups; the Pennsylvanian into 4 groups; Mississipipan, Devonian, Silurian and Montoya are shown separately. The Ordovician is separated into Simpson and Ellenburger.

The map shows sections and surveys, towns, railroads; dry holes with operator and farm name and total depth.

ARK-LA-TEX

EAST TEXAS

Smackover Discovery Looms In Limestone County

Smackover oil production, 4 miles southwest of the town of Mexia, was in sight last week. This formation has been the goal for many deep wildcats. Currently there is one other Smackover producing area in East Texas, which is in the New Hope area in Franklin County.

Humble Oil & Refining Co. 1 Ross, within the Mexia field, flowed oil while testing at 8,540-88 ft.

The prospect is Humble Oil & Refining Co. 1 Joe Ross heirs, located in Pedro Varela Survey, which is within the Woodbine-producing Mexia field. Location is on the Mexia-Talco fault system.

The first section tested, and identified as Smackover by operators, was from 8,540-88 ft. Gas showed in 6 minutes and oil in 42 minutes. The flow was estimated at 40 bbl. in 24 hours. Choke size was not reported. Flowing pressure ranged from 970-1,386 psi., and 70-minute shut-in pressure reached 3,870 psi. Gravity was 48°. Operators were testing at 8,583-8,614 ft. at this writing.

Henderson strike completed . . . Pure Oil Co. 1 Stephens Lake Land Co., Rodessa discovery in the 1-well Cayuga

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gas field, has been completed. Flowing potential was 196 bbl. of 43° oil a day through 16/64-in. choke.

Pay perforations were from 7,436-44 ft. Top of pay was 7,436 ft., on elevation of 270 ft. Flowing tubing pressure was 300 psi., and gas-oil ratio was 858:1.

NORTH LOUISIANA

First Oil Well Finaled In Locust Ridge Field

Southern Natural Gas Co. has completed the first oil well in southeastern Tensas Parish's Locust Ridge gas-condensate field.

The 1 Philip Watson, 28-10n-11e, flowed 165 bbl. of 39.3°-gravity oil per day on ⅛-in. choke from perforations in the Massive sand of the Tuscaloosa at 9,101-10 ft. The oil well strike is 3,450 ft. southeast of the discovery well of the field, Rowley 1 Adams, C NE SE 20-10n-11e, which was completed as a Massive sand gas-condensate discovery at 9,076-96 ft.

Production Extended In Claiborne's Colquitt Area

Stanolind Oil & Gas Co. has extended Smackover production in the Colquitt area of Claiborne Parish, Louisiana, ½ mile to the east with its 1 Ward.

Based on a 3-hour and 10-minute test, the well flowed at a calculated potential of 319 bbl. of 43.6°-gravity oil per day through ¼-in. choke. Test was made through perforations at 9,997 to 10,002 ft. The well also produced gas at an estimated daily rate of 400,000 cu. ft.

The Smackover was topped at 9,940 ft. and total depth of the 1 Ward is 10,287 ft. Location is C SE 26-25n-6w, Claiborne Parish, Louisiana. The 1 Ward is Stanolind's second producer in the Colquitt area where the company has leases on about 1,000 acres.

January Discovery Toll

The North Louisiana district recorded one new-pay discovery and three extension strikes in January.

Carter Oil Co. 1 Rhymes-McGuire, C NE SW 23-17n-4e, was a new-pay discovery in Bridge Brake field, Ouachita Parish. The well flowed an estimated 5,000 M.c.f. of dry gas per day on ⅜-in. choke from perforations at 5,079-84 ft. in the upper Pettit. This is the second well in the field. The discovery well had dual production in the lower Pettit and Travis Peak pays.

Cottage Grove . . . George Belchic, Jr. 1 Johnston, 13-21n-14w, Bossier Parish,

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flowed 95 bbl. of Buckrange oil per day on ¼-in. choke from perforations at 1,939-47 ft. to extend this field.

Stanolind Oil & Gas Co. 1 Hunter, C NE SW 28-17n-16w, flowed 1,070 M.c.f. of gas per day and 51.5 bbl. of condensate on 12/64-in. choke from perforations at 8,515-70 ft. to extend Cotton Valley "D" sand production in Caddo's Greenwood-Waskom field.

In Catahoula Parish on the Wilcox trend E. C. Wentworth 1 Beltzhoover et al, C SW NW 8-5n-6e, extended Wilcox oil production 1⅛ miles northeast at Larto Lake field. The well completed for 98 bbl. of oil per day at 5,716-19 ft.

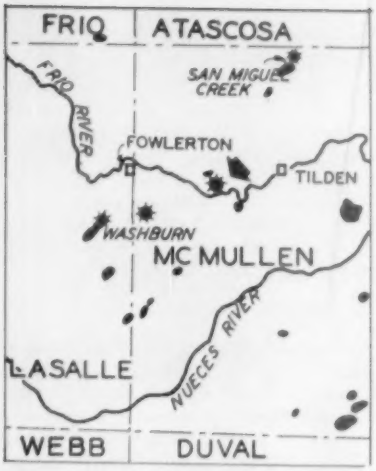
GULF COAST

SOUTHWEST TEXAS

Edwards Lime Produces In New McMullen Discovery

Deep exploration extending southwestward into McMullen and LaSalle counties from the Balcones fault trend of development is being rewarded with another gas-condensate discovery, located 7 miles southwest of Tilden, in central McMullen County.

The discovery, by Standard Oil Co. of Texas at its 1 Dilworth, is in what



Arrow points to new Standard Oil Co. of Texas Edwards lime discovery in McMullen County. Starred circles at Washington and San Miguel Creek fields and unnamed area near LaSalle-McMullen county line show previous Edwards discoveries.

is believed to be Edwards lime, principal producing horizon along the Balcones fault.

Only a few scattered tests have drilled to the Edwards in McMullen and LaSalle counties, where the formation is found at much greater depths. Only three, prior to the new discovery, found production, which has been gas, or gas-condensate.

Pay in the new Standard well is in open-hole at 11,389-95 ft. Bottom is in sidetracked hole drilled from 10,224 ft. after a long, unsuccessful fishing job in the first hole, drilled to 12,758 ft.

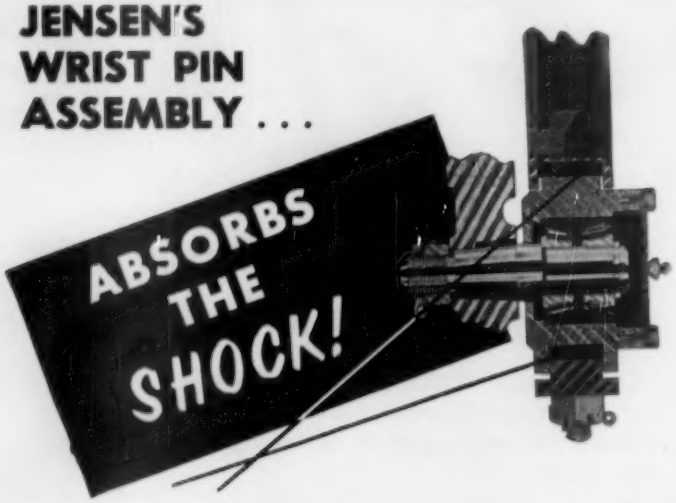
Daily flow rates in short-period tests through various chokes were: 8,400,000 cu. ft., ¼-in. choke, tubing pressure 1,350 psi.; 7,000,000 cu. ft., ¾-in. choke, tubing pressure 2,050 psi.; 3,000,000 cu. ft., ⅞-in. choke, tubing pressure 3,750 ft.

The well, from derrick-floor elevation of 310 ft., had top of Navarro at 6,933 ft., Austin chalk at 10,552, Buda at 11,057 ft., and Georgetown at 11,140 ft.

Location is approximately 10 miles east of an Edwards gas-discovery well, 1 South Texas Syndicate, completed early this year by H. R. Smith. On the accompanying map, it is shown as an unnamed area near the LaSalle County line, about 6 miles southeast of Fowlerton. It has been shut-in without potential gage. Its pay is at 10,658-82 ft. with Edwards top at 10,660 ft., elevation 467 ft.

Previously, last September, Standard Oil Co. of Texas completed an Edwards gas-discovery well on the north edge of the Washburn (Wilcox) field, 7 miles southwest of Fowlerton, in LaSalle County. It had the pay at 10,258-10,326 ft. and 10,340-46 ft. Elevation

JENSEN'S WRIST PIN ASSEMBLY . . .



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435½ ft. The only other Edwards well in the two counties is at San Miguel Creek field, in northern McMullen County. It was completed by Humble Oil & Refining Co. in 1953 at 1 Gubbels with gas-condensate production at 10,149-82 ft.

TEXAS GULF COAST

Refugio Adds New Oil Pay

Fitzpatrick Drilling Co. has opened a new Frio oil reservoir in the old Refugio field, Refugio County. Its discovery well, 2 John O'Brien, is good for 120 bbl. of oil per day on 3/32-in. choke. Pay interval is 6,381-84 ft. Gravity of the oil is 42°. Flowing pressure was 1,075 psi. Location is inside the townsite, heart of the field, producing from a multiplicity of shallower and deeper sands.

Second Well Adds New Pay For Chicolete Creek Field

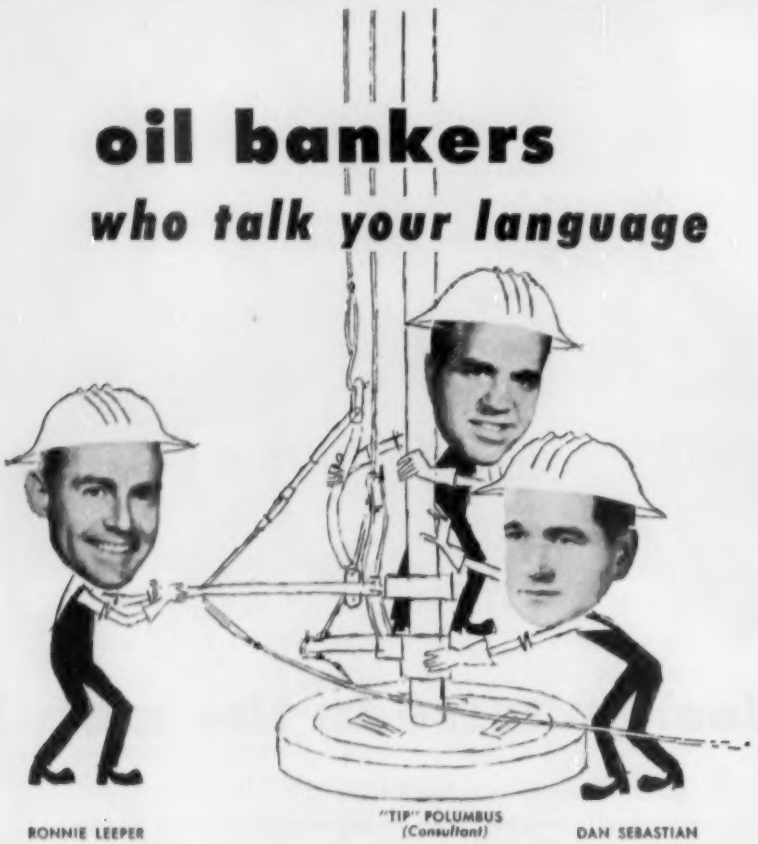
Sun Oil Co. has given the new Chicolete Creek field, in southwestern Lavaca County, its second successful completion and another productive zone.

Its 1 Borchers, 1,980 ft. southwest of Atlantic Refining Co.'s discovery well, 1 Neuhaus, completed last July, is rated good for 44,000,000 cu. ft. of gas per day, open-flow potential. Condensate yield is at the rate of 1 barrel per 45,300 cu. ft. of gas.

Producing interval, in Wilcox sand, is 8,841-54 ft. Atlantic's discovery well produces from Wilcox sand at 9,136-9,238 ft. Sun drilled its well to 9,325 ft. for a look at the discovery well's pay before completing in the upper zone.

Two dry holes have been drilled, one by Atlantic, 5,011 ft. northeast of the initial well, and the other by Hulen H. Hunt, 4,000 ft. west of it.

The area is 7 miles southeast of Hope, near the Jackson County line. It is 3½ miles east of Helen Gohlke field, on the Victoria-DeWitt county line.



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17TH AND STOUT STREETS • DENVER

East Aransas Area Gets New Dual-Zone Producer

Production of the new East Aransas field, northeast of Aransas Pass, in Aransas County, is being extended southwestward toward the old Aransas field by a dual-zone oil and gas well F. William Carr is completing at his 1 Crow & Martin.

Oil production, testing at the rate of 116.45 bbl. per day through ⅛-in. choke, is from Marginulina sand, perforated at 7,310-18 ft. Gravity is 41°. Flowing pressure is 1,050 psi. Gas flow, not gaged, is from perforated interval at 7,015½-39 ft.

This gives the field, opened last July by Atlantic Refining Co., four wells with oil production from 7,300-ft. and 7,800-ft. sands, and gas from 7,000-ft. and 7,675-ft. sands. Three of the wells are dual completions.

MISSISSIPPI

New Wilcox Oil Discovery Indicated in Adams County

A new Wilcox field is in the making in Adams County where John S. Callon and T. J. Glennon are testing promising oil showings in their 1-A Board of Supervisors, a wildcat 3½ miles south of Cranfield, and about 20 miles southeast of Natchez.

Showings were in the McKittrick zone below 6,230 ft. A drill-stem test before casing was run filled 3,750 ft. of oil with 350 ft. of water in 17 minutes through ¼-in. top and bottom chokes. Interval taken in was 6,230-37 ft.

Since the test hole has been carried to 6,660 ft., and has casing run to 6,290 ft. Casing is being perforated for production tests.

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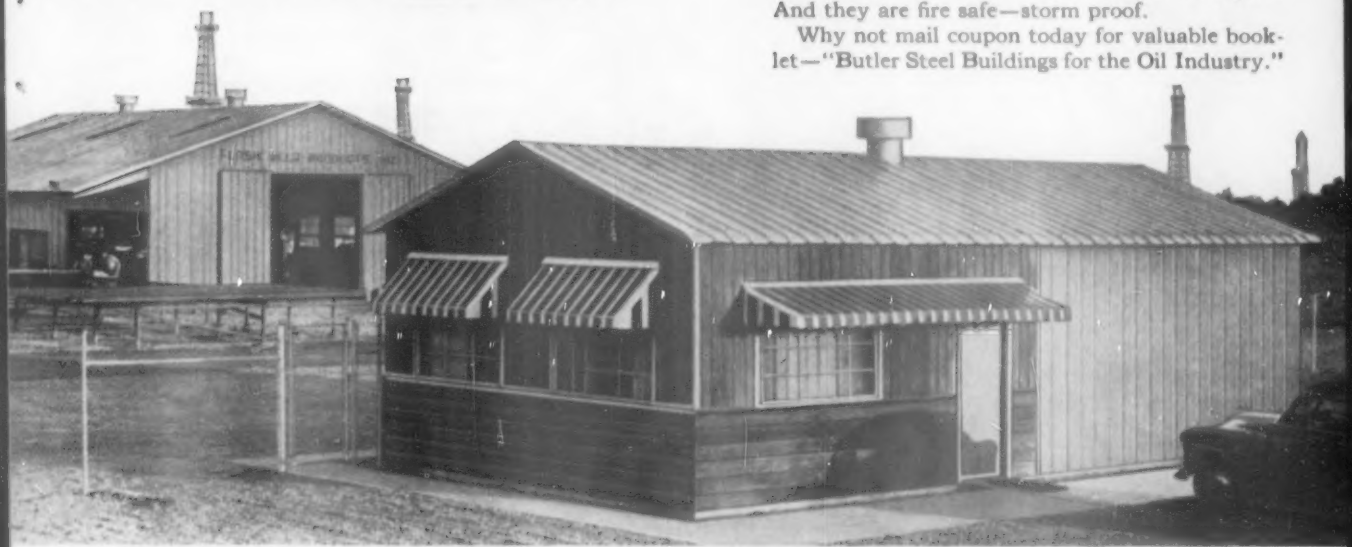

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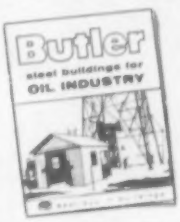

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will be Mississippi's first discovery this year.

SOUTH LOUISIANA

South Pass 20 Gas Field Gets First Oil Producer

South Pass Block 20 field, 10 miles off Terrebonne Parish, in the Gulf of Mexico, got its first oil production with the completion by Magnolia Petroleum Co. of its 2-A State Lease 793.

The well, in Block 19, east of the field's two shut-in gas wells, flowed at the rate of 818 bbl. of 35°-gravity oil per day through 5/32-in. choke. Completion is in sand at 10,274-90 ft. Hole was drilled to 12,770 ft.

The two gas wells, the first completed in August 1951, are in an 8,100-ft. sand.

West Delta Strike Opens Second Oil Pay This Year

California Co. has a new oil-discovery well in West Delta Block 30 field, 8 miles off Plaquemines Parish, in the Gulf of Mexico.

It is 1-A State Lease 1069, completed in sand at 8,186-8,222 ft. with a flow rate of 232 bbl. per day through 9/64-in. choke. Flowing pressure is 1,670 psi., and gas-oil ratio of 985 cu. ft. per barrel.

This is the second oil discovery for the field this year. Early in January, Humble Oil & Refining Co. completed a good oil producer in a deeper sand at 8,733-50 ft.

Previously, the field had only two shallow-sand gas wells, both shut in. The first was completed in April 1949. Two dry holes have been drilled.

Golden Meadow Spreads

Natural Gas & Oil Corp. has extended Golden Meadow's shallow-sand productive area ½-mile east with a small gas well from perforations at 2,604-16 ft. The well is shut in under pressure of 1,150 psi. Golden Meadows, an old multi-pay field, is in the tidal marshes bordering Bayou Lafourche, in southern Terrebonne Parish.

EASTERN INTERIOR

ILLINOIS

West of Eldorado in Saline County B. M. Barton et al have the biggest well to date in this highly-active area of the Illinois basin. It is the 2 Lucille Goschorn Community in 20-8s-7e.

The well flowed 1,560 bbl. of oil per day from the Tar Springs sand at 2,184-2,200 ft. on ¼-in. choke after fracture treatment. The big well is just outside the city limits of Eldorado.

WESTERN KENTUCKY

In Union County, Stouder Drilling Co. 1 Freeman Tucker, 11-O-19, ½ mile north of Morganfield, is pumping on beam and flowing 238 bbl. of oil per day from 2,714-19 ft. in the McClosky lime. The well is 2 miles from nearest McClosky production.

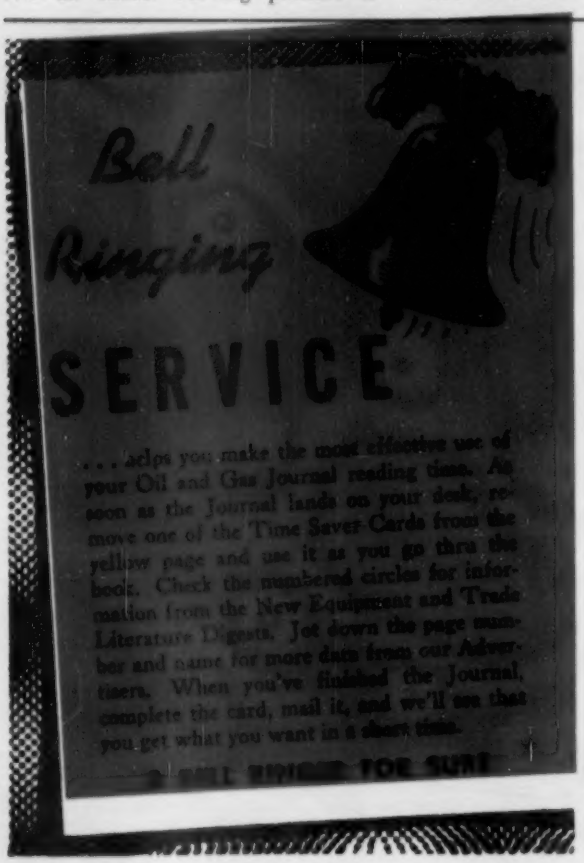
GREAT LAKES

MICHIGAN

Salt Mine Gas Strike Plugged In Wayne County

Latest information from Romulus Township in Wayne County indicates that The International Salt Co. core test in NE SE NW 15-3s-9e, has been plugged.

The well gaged gas in excess of 6,500 M.c.f. per day from the basal Salina-Niagara. The well was drilled in search of possible salt mine prospects. The core test logged gas pay at 2,002-04 ft. and the hole was bottomed at 2,004 ft., total depth.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Considerable leasing activity has centered around this core test in every direction but south. On the south side the Wayne County Airport, 2,000 acres, temporarily blocks immediate leasing action in this direction.

With The Taggart Co. and others controlling leases to the north, northeast, and northwest, it is expected that early wildcat drilling will be done in the area.

APPALACHIAN

WEST VIRGINIA

In Washington district, Upshur County, West Virginia, Washington Natural Gas Co., located 1 Minnie Cress et al, wildcat, elevation 2,120 ft., Sago Quadrangle, 5.57 miles south of latitude 38 degrees 55 minutes and 2.2 miles west of longitude 80 degrees 5 minutes. If this well is successful as was 1 Zickefoose by George I. Tennant, it will cause considerable drilling on the west slope of the Hiram anticline which is productive in Middle Fork and Roaring Creek district, Randolph County and Glade district, Webster County.

- Grant district, Jackson County, D. D. Foster, announced 1 Loyd Burdette, elevation 915 ft., Belleville Quadrangle, 2.12 miles south of latitude 39 degrees 5 minutes and 4.1 miles west of longitude 81 degrees 40 minutes.
- Circleville district, Pendleton County, Columbian Carbon Co. 2-1203 U.S.A., after a lengthy fishing job at 5,890 ft., is drilling and is now at 6,032 ft.

OHIO

A completion ⅓ mile west of two old abandoned producers in Somerset field indicates a new pool. Hopewell Drilling 1 H. L. Love, Section 13, Reading Township, Perry County, logged the Clinton at 2,747-87 ft. with 230,000 cu. ft. of gas and good show of oil natural that increased to 500,000 cu. ft. of gas and 50 bbl. of oil in a 24-hour test after treatment.

- In the west central part of New Castle Township, Coshocton County, a new area is developing. Mutual Oil and Gas 1C Clyde Cornell, second quarter, found a fair oil showing in the Clinton, 3,074-3,118 ft., that produced 55 bbl. in 24 hours after fracturing.
- A stepout of ⅔ mile by Roy Stewart on 1 Joe Maibach, Section 20, Milton Township, Wayne County, resulted in a 2,280,000 cu. ft. gasser with 1,140 psi. rock after treatment. Clinton was topped at 3,175 ft. with 875,000 cu. ft. natural.

EASTERN KENTUCKY

In Leslie County, United Fuel Gas Co. have plugged and abandoned their

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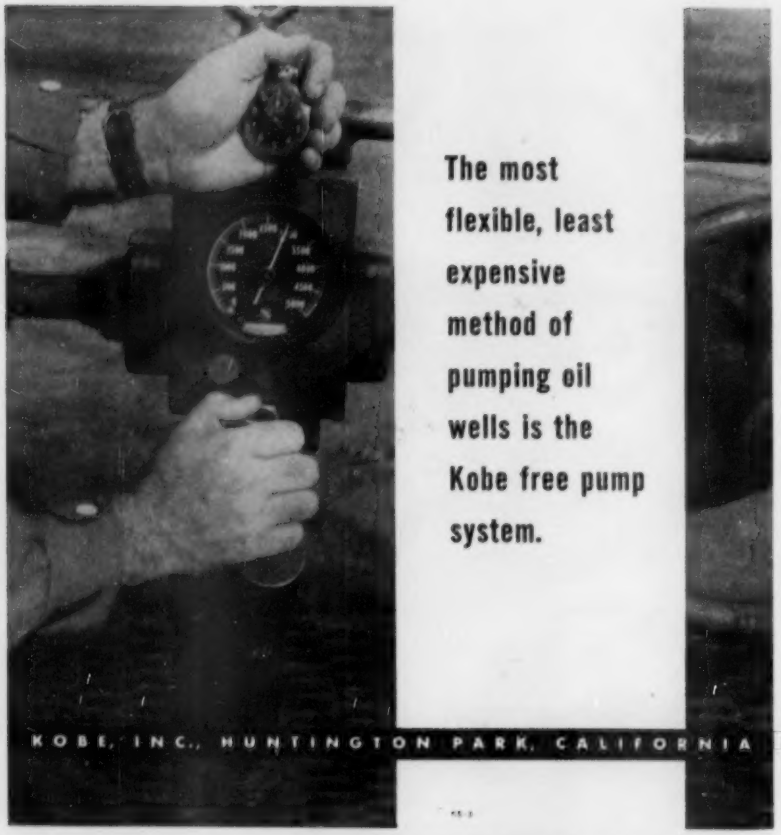

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wildcat 10 Fordson Coal Co., located on Jacks Creek. Important formation markers are: Maxon sand at 2,134 ft., Big Injun sand 2,575 ft., Devonian black shale 2,906 ft., Corniferous lime 3,170 ft., and Clinton shale 3,264 ft. Total depth was 3,626 ft.

• In Pike County and located on Wolfpit Branch, United Carbon Co. has completed 34 Republic Steel Corp. as a Devonian black shale gas well. Producing shale formation was topped at 3,524 ft. and drilled to a total depth of 4,325 ft. On open flow after shot, well gaged 169,000 cu. ft. of gas daily.

PACIFIC COAST

CALIFORNIA

Fresno Find Flows At 3,000-Bbl. Rate

Los Nietos Co., Operator 55-1 Bordieu in the Coalinga area of Fresno County was completed flowing at a rate of 2,927 bbl. daily. The 11-hour test was through a 1-in. choke. The 30.2°-gravity crude was accompanied by 3,500 M.c.f. of gas.

Production is from the Gatchell sand, of Lower Eocene age, at a depth of approximately 10,630-10,737 ft. Located in NW SE 1-21s-16e, the wildcat is 2 miles southeast of Guijarral Hills field. This produces from the shallower (8,000-9,000 ft.) Leda and Allison sands. Coalinga Nose, largest Eocene reservoir discovered to date in San Joaquin Valley, lies about 5 miles northwest.

Kern Outpost Testing

A Shell Oil Co. outpost ½ mile west of Strand field, Kern County, may have found a new Miocene sand pool. Its 1 Posuncula yielded a 6,900-ft. rise of 30°-gravity crude on a 1-hour formation test at 9,535-92 ft. Location of the possible extensioner is in NE NE 12-30s-25e, on a 2,000-acre block acquired from Kern County Land Co. It was originally scheduled to go to 15,000 ft. as a thorough test of Miocene oil possibilities.

New Sunset Beach Find

Successful completion of a wildcat about midway between Huntington Beach and new Sunset Beach field 1 mile northwest indicates production might be more or less continuous throughout the link area. J. B. Crawford et al 11 Holbrook-Isbell-Howard in SW SE 20-5s-11w flowed 500 bbl. daily through a 20/64-in. choke. Perforated interval was 6,461-6,600 ft.

The operator was drilling 18 Crawford as a north offset.

Beverly Deep Test

Universal Consolidated Oil Co. 4 20th Century-Fox was drilling below 10,000 ft. from the film corporation's studio at the edge of Beverly Hills. Projected depth of the well was not given. The regular Miocene pay was found at about 7,000 ft. Pending completion of a pipeline outlet the three wells so far completed have not been placed on production.

ROCKY MOUNTAIN

MONTANA

Deep Test Located In Valley County

Gulf Oil Corp., Sinclair Oil & Gas Co., and Carter Oil Co. have made location for a joint test to Winnipeg in the Lindsey area of Valley County. The well is 1 Lentzner, C NE NE 9-32n-42e. There has been no previous drilling within a radius of more than 10 miles.

Roosevelt County Discovery Tested

The California Co. recovery oil on test of Charles at 1 Grimm, C NE SE 13-32n-49e, in the East Bredette area of Roosevelt County. Test at 6,538-53 ft. in "C" zone of Charles flowed oil after 1¾ hours. Flowing pressure ranged from 190-2,740 psi. The well was flowed to tanks for a 1-hour period with recovery of 19.8 bbl. of oil. This test was on ¼-in. choke. The operator has shut the well in, pending orders.

The wildcat is the first apparent discovery of 1955 in the Williston basin in eastern Montana. It is about 18 miles northwest of East Poplar production

Northeast Landa field in Bottineau County, North Dakota, has a 312-bbl. per day oil well at Calvert Exploration 1 Gravseth.

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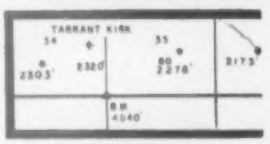

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This 'Jeep'-propelled trencher digs trenches up to 5 feet deep at the rate of 300 feet an hour. Mounted on the 'Jeep' and powered by its *Hurricane* Engine, it gets to the job in a hurry, speeds up the laying of pipe, cable or drain tile. Traveling at road speeds to the job, the unit is ready for trenching in a matter of minutes. Greater mobility makes the 'Jeep' trencher profitable for short runs of trench. It will pay you to investigate all the time-saving advantages of the 4-Wheel-Drive Universal 'Jeep'.

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and some 23 miles northeast of Wolf Point, where Continental Oil Co. had a short-lived Madison discovery 2 years ago. There has been almost no drilling in this area in the Poplar area and in in this area of the county. Principal Roosevelt County activity has been in the Poplar area and in wildcat prospects to the north and east of Poplar.

Roosevelt County Wildcat Abandoned

Deep Rock Oil Corp. has abandoned 1 LePage, C NW SW 14-28n-59e, Roosevelt County. The wildcat went to total depth of 9,548 ft. in Madison.

Cores of this formation recovered limestone with good shows, but with very little porosity and permeability. Casing was set and the formation heavily acidized, but tests were not successful.

Blaine County Location Staked

Sohio Petroleum Co. will drill a 4,500-ft. Lodgepole test at 1-A Flynn, C SW SE 22-34n-20e, in the Northeast Chinook area of Blaine County. The well is 7 miles west of a recent failure which had good shows in Sawtooth, as have several other wells in this general area of the state.

Glacier County Wildcat Testing Madison

Carter Oil Co. is testing Madison at 1 Thelan, C NE NE 13-37n-9w, in the Landslide Butte area of Glacier County. The well is bottomed at 4,788 ft., with top of Madison located at 4,657 ft. The operator recovered free oil on drill-stem test of upper Madison and has run pipe for further testing.

WYOMING

Fremont County Mesaverde Test Staked

Phillips Petroleum Co. has made location for a Mesaverde test at 1 Boysen, C SE SW 27-5n-5e, Fremont County. The well is 30 miles north of Beaver Creek which has Mesaverde oil production from about 3,700 ft. It is on the northeastern side of the Wind River basin.

Second Pinedale Area Wildcat Spudding

El Paso Natural Gas Co., Continental Oil Co., and Malco Refineries, Inc., are preparing to spud their second test of the Pinedale anticline in Sublette County. The well is 2 Unit, N½ SW SE 29-31n-108w. It is to test Fort Union at about 10,500 ft. The initial test on the unit is being completed for 4,000 M.c.f. of gas per day from zones below 9,500 ft., tentatively reported as in Fort Union.

Tests Starting at Apparent Washakie County Discovery

Superior Oil Co. has landed pipe and is preparing to perforate and test 1 Government-Chittim, C SW SW 29-47n-90w, in the Sherard area of Washakie County. The well topped Phosphoria at 8,794 ft. and test 8,793-8,838 ft. recovered heavily oil-cut mud. The well is 12 miles east of the town of Worland.

New Pay Discovery in Seven Mile Field Near Completion

The California Co. swabbed at the rate of 7 bbl. of oil and 3 bbl. of water from Lakota perforations at 3 Seven Mile Unit, SE SW 9-17n-77w, Albany County. The operator will complete in this formation. Discovery well in this field was completed in Muddy. In the current well, only slight shows were recovered from Muddy.

THE OIL AND GAS JOURNAL

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NEBRASKA

Kimball County "J" Sand Discovery Tested

Zoch, Campbell & Love-Miller Drilling recovered 3,000 ft. of oil on test of "J" sand at 1 Pound, NW NW 14-16n-54w, Kimball County. Test was at 5,785-5,810 ft. and tool was open 70 minutes. Recovery was gas cut and included in addition to the oil, 150 ft. of oil-cut mud. Flowing pressure was 220-735 psi. The operators have run pipe and are preparing to perforate and test as soon as weather will permit.

Cheyenne County Discovery Completed

Ryan-Davis Oil Co. and Cimarron-Western Drilling Co. have reported an initial of 168 bbl. of oil per day on pump at 1 Graham, SW SW SW 20-16n-51w, Cheyenne County. Production is from "J" sand at 5,217-23 ft.

COLORADO

Weld County Lyons Test Announced

C. H. Osmond is moving in for test of Lyons (Permian) sand at 1 Dier, C NE SE 8-2n-67w, Weld County. Objective is expected at about 9,500 ft. The wildcat is 6 miles northwest of Fort Lupton, in an area which has had no previous drilling.

Tests Begin at Eastern Washington County Discovery

Thompson and Oliver recovered 400 bbl. of water and 100 bbl. of oil on swab test of 1-ft. perforated interval at 1 Warren, SW SW NW 11-2n-49w, in eastern Washington County. The zone, at 3,844 ft., has been squeezed and additional tests are in progress. Drill-stem test of this wildcat recovered 1,340 ft. of oil in 1 hour from the zone 3,835-51 ft. The well is 28 miles east of previous Denver-Julesburg basin production.

Moffat County Discovery Shut In

Moore & Gilmore, Halbert & Jennings and U. S. Smelting, Refining & Mining Co. have completed 1 Kern, C SE NW 13-8n-93w, in the North Lay Creek area of Moffat County. The well blew out from about 750 ft., and the operators reported a flow of about 3,000 M.c.f. of gas per day. The well is completed as a shut-in gas discovery, with no production string run, pending market outlet. Additional shallow wells will be drilled later in this area, according to the operators.

Drilling Started at New Jefferson Deep Wildcat

S. D. Johnson has spudded 1 Farmers Highline Canal and Reservoir, SE SE NW 7-3s-69w, in the Golden area of Jefferson County. The well is 3 miles northeast of Golden and 12 miles north of Johnson's recent apparent discovery in the Morrison area, 1 Pallaoro, SW NE NW 7-5s-69w.

WESTERN CANADA

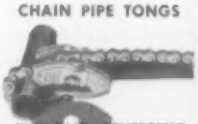
SASKATCHEWAN

Socony Gets Two New Strikes In Province

Socony-Vacuum Oil Co. of Canada, Ltd., held major interest in western Canada exploration by coming up with two new discoveries plus the addition of another zone at a previously reported discovery.

Socony's find of an additional zone came at Socony-Woodley-Southern 10-

WILLIAMS CHAIN PIPE TONGS



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STRUCTURAL BOX — Long, sturdy, tapered handle easily inserted for lining up bolt holes. Ample strength and leverage. Can be supplied with heads bent up to 90° left or right of handle.

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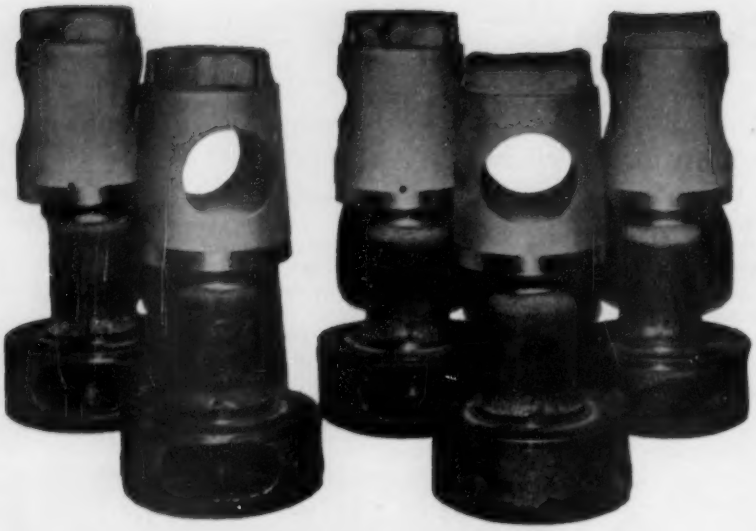


Colmonoy Spraywelding Hard-Faces Valve Plugs

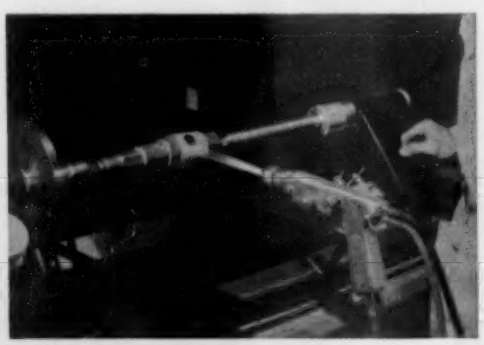
Longer valve plug life is a goal sought by everyone concerned with valves in the process industries. Hamer Valves, Inc. (California), makers of valves for the petroleum and chemical industries, reports new success in this field.

They're hard-facing valve plugs with Colmonoy No. 4 alloy, applied with the Colmonoy Spraywelder. These Spraywelded plugs last 3 to 4 times longer than hard-chrome plated plugs.

The cement-slurry valve plugs (above) are shown after the Colmonoy overlay was sprayed and fused. The close tolerance spraying will require little grinding to bring plugs to size.

Hamer valve plugs shown after finish grinding of the Colmonoy overlay.

The Colmonoy Spraywelder is a metal spraying unit for applying powdered Colmonoy alloys. These alloys impart superior abrasion and corrosion resistance to finished metal parts. After spraying, the overlay is fused to the part with an oxy-acetylene torch. The Hamer set-up above shows a plug being sprayed while rotating in a lathe.



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10 Nottingham on LSD 10, 10-5-32w1, which had previously been recorded as a discovery in the Crinoidal zone of the Mission Canyon. The new pay was reported as an Oolitic zone of that same formation.

Most encouraging of the two new strikes by Socony was at the Battrum area wildcat. This well, 9 miles north of Fosterton field, found medium gravity oil in the Roseray sand. The well is the Socony-Woodley-Southern 28-6 Battrum, LSD 6, 28-18-17w3.

Alberta . . . The other Socony discovery was recorded at 3-6 Hussar CPR, LSD 6, 3-24-20w4, 30 miles south of Drumheller and 55 miles east of Calgary at Hussar.

Los Nietos Co. found Cardium sand production at a wildcat in the West Alder Flats area of Alberta, about 12 miles south of the main development sector of Pembina field.

Sun Oil Co. has a gas discovery in the basal quartz at a wildcat in the Ghost Pine Creek area of Alberta, 60 miles northeast of Calgary.

Successful Wildcats

SOUTHWEST TEXAS

Atascosa County: Plymouth Oil Co. 2 Finch, Calba Fuqua Sur., A-271 (2 miles south of Jourdanton). IP 70.4 BOPD, 18.8°, open hole 1,578-82 ft. TD 1,582 ft. (New field.)

Duval County: Magnolia Petroleum Co. 4 Duval State 102, J. Poitevent Sur. 102. IP 22,000 M.c.f. daily, open-flow potential, gas-condensate ratio 49,500 cu. ft. per barrel, 60°, perforations 7,000-25 ft. and 7,032-44 ft. TD 7,500 ft. (New pay in Brelum field.)

Frio County: Howeth & Mason 1 Schuchardt, Mary Pigford Sur., A-717. IPP 19 BOPD (net), 27°, Austin chalk 4,942-5,260 ft. (open hole). TD 5,260 ft. (New field—Sano Hollow.)

McMullen County: Smith & Davis Production Co. 1-B Smith, J. D. Osbourn Sur., A-970. IPP 4 BOPD, 26°, perforations 913-18 ft. TD 929 ft. (New field.)

TEXAS GULF COAST

Matagorda County: Kirkwood & Morgan, Inc., 1 Armour, Ben Rawls and O. H. Stout Sur., A-82. Shut-in dual-zone dry-gas well, no gage, perforations 2,849-54 ft. and 2,898-2,902 ft. TD 8,800 ft. (New field—2¾ miles northeast of Bay City field.)

Nueces County: Renwar Oil Corp. and Phillips Petroleum Co. 4 Blacknall, O. R. Warner Sur. 74. IP 53 BOPD, ½-in., 24°, perforations 4,431-35 ft. TD 4,555 ft. (New pay in Viola field.)

San Patricio County: Appell Oil & Gas Co. 4 Brown, Block 15, Summers Subd., Delgade Grant (3 miles southeast of Mathis). IPP 57 BOPD (net), 34°, perforations 4,433½-41 ft. TD 5,007 ft. (New field.)

Victoria County: Sunray Oil Corp. 11 Union-Keeran, Martin de Leon Sur., A-74. IP 46 BOPD (net), 14/64-in., 35.9°, perforations 6,094-99 ft. TD 6,500 ft. (Extends Union-Keeran area.)

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In areas where tool joints must be replaced before the drill pipe is retired—or where tool joints outlast the drill pipe, American Iron hand-applied Straight Grip tool joints offer your best investment.

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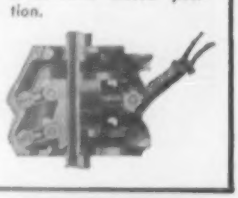

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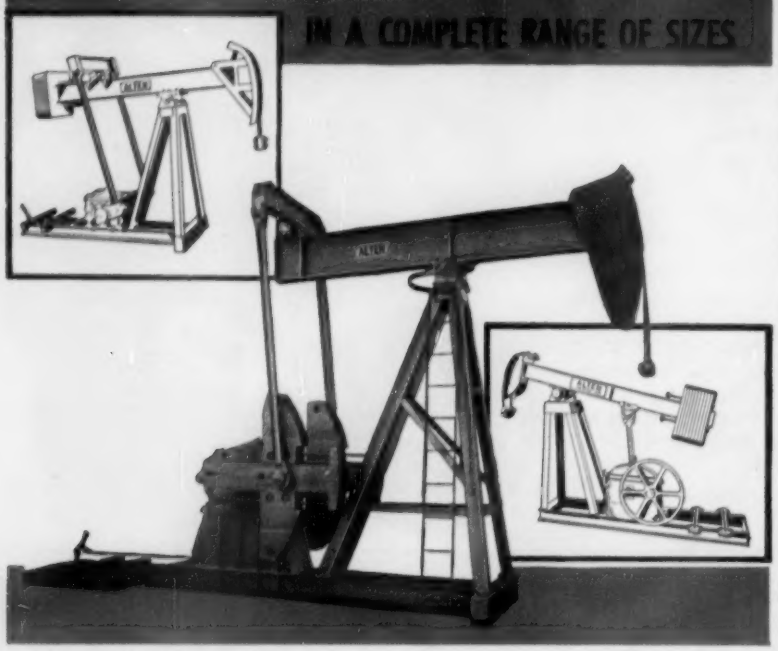

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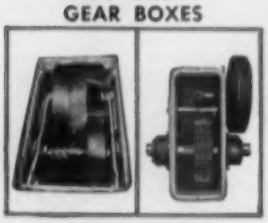

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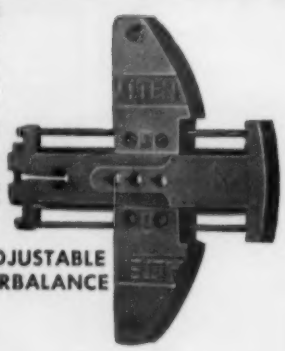

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WEST CENTRAL TEXAS

Jones County: Apache Drilling Co. 1 Bruleson, Subd. 12, J. W. McKissick Sur. 208, 7 miles SW Anson. IP 88 BOPD, 16/64-in., TP 140 psi., 40°, GOR 450, Canyon sand 3,463-67 ft., elev. 1,755 ft. TD 3,493 ft.

Throckmorton County: Warren Petroleum Corp. 7 Greathouse, Sec. 1692, TE&L Sur., 9 miles E Throckmorton. IP 264 BOPD, 16/64-in., TP 300 psi., GOR 543, 46°, Mississippian pay 4,660 ft. TD 4,671 ft.

NORTH TEXAS

Archer County: Mrs. James R. Dougherty 1-B Carpenter, Lot 39, Blk. 4, Clark & Plumb, 4 miles W Windthorst. IP 294 BOPD, 20/64-in., TP 100 psi., 40°, GOR 250, Strawn 3,449-63 ft., elev. 1,000 ft. TD 3,975 ft.

Clay County: Jack Grace Production Co. 1 Mayfield, C. Thompson Sur., A-444, 2 miles N Joy. IPP 86 BOPD, 41°, GOR zero, Strawn sand 3,316 ft., elev. 1,032 ft. TD 4,810 ft.

Grayson County: Standard Oil Co. of Texas 1 Millsap, James M. Hambright Sur., A-538, 2 miles NW Sherman. IP 127 BOPD, 16/64-in., TP 700 psi., 36°, GOR 3,470, sand pay 8,040-8,170 ft., elev. 824 ft. TD 9,431 ft.

Montague County: Eureka Oil Co. 1 Lerner, Blk. 45, Wm. Ainsworth Sur., A-1, 6 miles W Nocona. IP 154 BOPD, ¼-in., TP 300 psi., 42°, GOR 495, conglomerate 5,249-59 ft., elev. 925 ft. TD 5,332 ft.

Wilbarger County: Dublin-Kiel 1-DD Waggoner, 42-4-H&TC, 15 miles SE Vernon. IPP 80 BOPD, 38°, GOR 300, Cisco 2,606-22 ft. TD 3,820 ft.

Wise County: Sherrod & Apperson 1-A Fuller, J. Kelly Sur., A-1144, 4 miles NW Chico. IP 153 BOPD, 20/64-in., TP 420 psi., GOR 1,800, 41°, conglomerate 5,387-92 ft., elev. 964 ft. TD 5,633 ft.

Young County: Miller & Banks 2 Glidewell, J. Davidson Sur., A-1418, 10½ miles SE Graham. IPP 44 BOPD, 40°, GOR 100, Strawn 1,560-72 ft. TD 1,653 ft.

WEST TEXAS

Crane County: Gulf Oil Corp. 2-A Dawson estate, 12-6-H&TC, 10 miles SW Crane. IP 384 BOPD, 14/64-in., TP 475 psi., 42.8°, GOR 1,507, Devonian 5,160 ft., elev. 2,408 ft. ground. TD 6,722 ft.

Runnels County: G. W. Strake 1 Bryan, L. Forsythe Sur. 450, 1 mile NE Wingate, new pay. IP 128 BOPD, 16/64-in., TP 600 psi., GOR 2,160, 42°, Gardner 4,977-83 ft., TD 5,265 ft.

SOUTH LOUISIANA

Calcasieu Parish: Ohio Oil Co. 38 Brown, 20-11s-13w. IP 502 BCPD and 2,801 M.c.f. daily, 12/64-in., 50.1°, perforations 10,222-34 ft. (Hackberry). TD 12,491 ft. (New pay in Phoenix Lake field.)

ARKANSAS

Union County: E. G. Bradham 1 Patterson Unit, C NW SE 19-18s-14w. IPP 40 BOPD, Glen Rose open hole 3,462-70 ft., 26°. TD 7,139 ft. (New pay in Hibank field.)

OKLAHOMA

Garvin County: Stanolind Oil & Gas Co. 1 Pitchlynn, SE SW SE 14-4n-2w. IPF 1,066 BOPD, Bromide 5,936-78 ft., 40°, ¾-in. TD 7,102 ft. (Oil discovery.)

Cities Service Oil Co. 1 McCoy, C NE NE 17-4n-4w. IPF 245 BOPD, 1,875 M.c.f. of gas per day, Hart sand 8,148-8,262 ft., 60.5°, 18/64-in. TD 8,900 ft. (Gas-distillate discovery.)

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sometimes...

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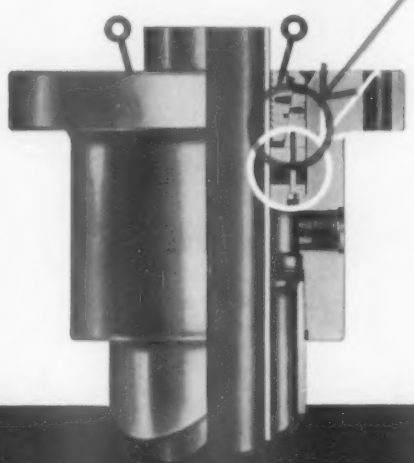

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P. O. Box 2180—Houston, Texas

Logan County: J. A. Shields 1-A State, NE NE SE 36-16n-1e, 2½ miles east of East Meridian pool. IPF 11 bbl. distillate per million, 21,700 M.c.f. of gas per day, Misener sand 4,940-49 ft., open tubing, 71°. TD 5,366 ft. (Gas-distillate discovery.)

Nowata County: Frankfort Oil Co. 1 Moore "A," SW SW NE 22-27n-14e. IPP 5 BOPD, Bartlesville sand 1,305-08 ft., 37°. TD 1,594 ft. (Oil discovery 1½ miles east of Bartlesville-Dewey field.)

Frankfort 1 Moore "B," SW SW NE 27-27n-14e, 1 mile south of production. IPP 9 BOPD, Bartlesville sand 1,175-81 ft., 37°. TD 1,750 ft. (Oil discovery.)

Frankfort 1 Moore "F," SW SW NE 34-27n-14e, 1 mile south of new production. IPP 22 BOPD, Bartlesville sand 1,208-12 ft., 37°. TD 1,470 ft. (Oil discovery.)

Payne County: Royal Oil & Gas Corp. 1 Brattain, SW SE NE 26-19n-3e. IPF 65 BOPD, first Wilcox sand 4,347-53 ft., 41.5°, 22/64-in. TD 4,383 ft. (Oil discovery 1⅛ miles northwest of Northwest Mount Hope field.)

Washington County: Frankfort 1 Moore "G," SW SW NE 28-27n-14e. IPP ½ BOPD, 1,200-05 ft. in Bartlesville sand and 1,261-66 ft., 37°. TD 1,519 ft. (Oil discovery 1 mile west of production.)

KANSAS

Barton County: Schermerhorn-Thunderbird 1 Hart, NE NE NW 9-20s-13w. IPF 190 BOPD, Lansing 3,317-25 ft., 42°. TD 3,542 ft. (Opens South Bend pool.)

Harper County: Carter Oil Co. 1 Levand, C SW SE 35-31s-9w. IPP 17 BOPD, Mississippian 4,392-98 ft. TD 4,400 ft. (Opens South Grabs pool.)

Kingman County: Cities Service Oil Co. 1 Voran, SE SW NE 27-29s-7w. IP 1,030 M.c.f. of gas per day, Mississippian 4,117-23 ft. TD 4,665 ft. (Gas discovery.)

Marion County: Anderson-Prichard Oil Corp. 1 Jost, SW NW SW 22-19s-2e. IPP 31 BOPD, Simpson 3,020-22 ft., 30°. TD 3,082 ft. (Opens French Creek pool.)

NEBRASKA

Cheyenne County, Graham: Ryan Oil Co.-Davis Oil Co.-Cimarron-Western Drilling Co. 1 Graham, SW SW SW 20-16s-51w. IPP 168 BOPD, "J" sand discovery, new field. TD 5,284 ft. Skull Creek.

CALIFORNIA

Los Angeles County: J. B. Crawford et al 11 Holbrook-Isbell-Howard, SW SE 20-5s-11w, IPF 780 bbl. 29°-gravity crude, 28/64-in. choke, perfs. 6,461-6,600 ft., TD 6,600 ft. (About ¼ mile east extension Huntington Beach field.)

Ventura County: Sunray Oil Corp. 1 Bailard-McGrath, NE NW 31-2n-22w, IPP 82 BOPD, 19.8° gravity, perfs. 11,748-92 ft., TD 13,462 ft. (New discovery ¾ mile east of West Montalvo field.)

COLORADO

Washington County: Alfred Ward & Son and Gem Oil Co. 1 Gebauer, SE SE SE 4-1n-53w. IPP 70 BOPD, "J" sand discovery, new field. TD 4,940 ft. "J" sand.

East Akron: Wytex Service Corp. and Jack Ladmer 1 Daniels, C SE SW 25-3n-52w. IPP 80 BOPD, "D" sand discovery, new field. TD 4,635 ft. "J" sand.

SASKATCHEWAN

Imperial 1-8 Browning, LSD 1, 8-4-5w2. Charles oil well. TD 6,025 ft.

ALBERTA

Hudson's Bay 1 Sundre, LSD 1, 4-34-5w5. Rundle oil well. TD 11,348 ft.

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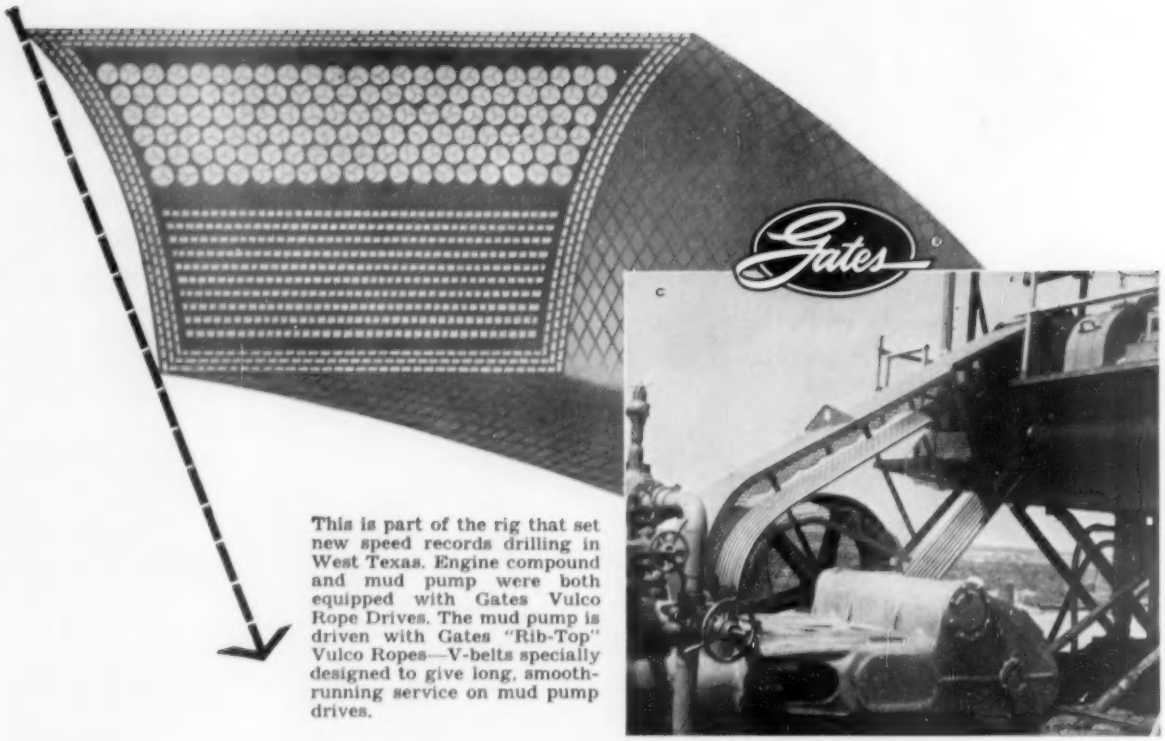

This is part of the rig that set new speed records drilling in West Texas. Engine compound and mud pump were both equipped with Gates Vulco Rope Drives. The mud pump is driven with Gates "Rib-Top" Vulco Ropes—V-belts specially designed to give long, smooth-running service on mud pump drives.

Concave sides keep belt costs down!

Industry is saving thousands and thousands of dollars every year by specifying Gates Vulco Ropes—the V-Belts with *concave sides* (U.S. Pat. No. 1813698).

Here's the interesting reason *why* Gates belts save money:

On the bend around the sheave the *precisely engineered* concave sides (Fig. 1) of the Gates belt fill out and become straight (Fig. 1-A). Thus the belt makes uniform contact with the sides of the pulley. That means sure pulling power and *even distribution of wear*. Longer wear, fewer replacements cut belt costs...reduce down time...contribute to profits.

Simple test proves value of concave sides

Bend a straight-sided belt (Fig. 2) and feel the sides *bulge out* around the bend. The bulging sides prevent the belt from fitting evenly in the pulley groove (Fig. 2-A). Uneven contact causes uneven wear...shortens belt life...increases costs.

Keep belt costs *down* by specifying Gates Vulco Rope Drives—the V-Belt with *concave sides*. Belts you need are readily available from nearby distributor stocks. The Gates Rubber Company, Denver, Colorado—*World's Largest Maker of V-Belts.*

Gates Engineering Offices and Distributor Stocks are located in all industrial centers of the United States and Canada, and in 70 other countries throughout the world.

TPA 25-C

GATES VULCO ROPE DRIVES

Gulf 4-15 Clear Hills, LSD 4, 15-88-2w6. Granite wash oil well. TD 6,938 ft.

Muskeg Gilwood A-2 Crown, LSD 9, 19-73-18w5. Granite wash oil well. TD 8,161 ft.

Stanolind "A" 1 Rose Creek Crown, LSD 12, 14-46-8w5. Indicated Cardium oil well. TD 5,555 ft.

OKLAHOMA

Two Deep Wildcats for Springer Trend Announced

Blackwood - Nichols will drill two deep tests in the Springer trend of Grady County's Bradley district.

One test, the 1 Lanier, will be located in SW SW 18-6n-5w, and will go to 12,500 ft. The other well is the 1 Standridge, SE NW 4-6n-6w. It also will go to 12,500 ft.

Bradley activity . . . Gulf Oil Corp. is in the Bromide sand at 1 Victoria, SW NE 14-5n-5w. Good staining and odor were noted on core from 11,847-92 ft. This well is northwest of the 1 Costello discovery . . . a 400-bbl. well in 5 hours from the Bromide sand in NE SE 14-5n-5w.

Magnolia Petroleum Co. 1 Williams heirs, SE NW 11-4n-5w, flowed on final test 296 bbl. of 36°-gravity oil in 24 hours on 16/64-in. choke from perforations in the Springer at 9,680-9,706 ft.

NORTH TEXAS

Bend Discovery Finished In Stonewall County

Rowan & Hope have completed a good flowing discovery from the Pennsylvanian Bend section, located 13 miles north of Aspermont. The well is 1 Ed Hahn, in Section 182, Block D, H&TC Survey.

On potential test the well flowed 303.86 bbl. of 38.8° oil a day, plus 5 per cent water, through 24/64-in. choke. Pay section was perforated at 6,288-83 ft. Gas-oil ratio was 510:1. Location is 2 miles northwest of Texas Pacific Coal & Oil Co. 1 Winter, recent conglomerate discovery.

Grayson County . . . Sinclair Oil & Gas Co. 1 Brown, wildcat 4 miles south of Sherman, tested a show of oil in the Davis sand at 8,012-66 ft., then drilled ahead. The section was tested with 1,075 ft. of water blanket. Gas surfaced in 95 minutes. Recovery was 45 ft. of oil and 1,180 ft. of oil and gas-cut water blanket.

Lone Star Producing Co. 1 Mayhew, deep test 2 miles southeast of Sherman, was drilling below 10,226 ft. in shale and lime.

Star Oil Co. 1 Whisenant, wildcat 3 miles northeast of Van Alstyne, was dry at 10,549 ft., total depth.

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PERSONALS

"Veep" at 41

Brockett named to head Gulf's Houston division

FORT WORTH is called home, and Texas A. & M. is called alma mater by E. D. Brockett, Jr., newly elected Gulf Oil Corp. vice president and manager of the company's Houston production division.

In his new post, he is returning to Texas after serving as manager of production operations in East Venezuela for Mene Grande Oil Co., Gulf subsidiary.

Fresh from Aggieland, Brockett—his friends call him "Del" — embarked upon his Gulf career in 1934 as a roustabout in the Fort Worth division. With the exception of a 5-year Army stint, he has been with the company since.

His meteoric rise—he's 41—came after a relatively slow start. His first 3 years were spent in roustabouting, roughnecking, and working on a connection gang. But the foundation laid in these early days helped as he became a petroleum engineer and was transferred to Odessa, Tex., where Gulf was beginning an expansion program.

While still in Fort Worth, he married a local girl, Frances Sammons, on March 7, 1936. They have a son, Belmont, who is now 17 and attends Allen Academy, Bryan, Tex., and a daughter, Janet, who is 4.

Early career . . . His early engineering work revolved around typical gas-oil ratio tests, bottom-hole-pressure tests, design of tank batteries, and installation of flow valves. With the emphasis upon conservation, he was shifted into the proration end of the production business and became responsible for Gulf's Zone 5 operations. In 1939, he was made assistant zone engineer.

In December 1940, he was called into the reserves for a 1-year period, which extended for a full 5 years. He was commissioned a first lieutenant and after a brief refresher course was assigned to a recruit-training center at Fort Belvoir, Va.

Early war career . . . In early 1942, the Japanese advances were cutting off crude sources in the East Indies, and he was temporarily assigned to New Zealand. There he acted as contracting officer for the Corps of Engineers and worked with Superior Oil Co., which had a concession to operate in that country.

This assignment was cut short as the armed forces concentrated on building up assault landing teams. He ended up with the Engineers Amphibious Command at Camp Edwards, Mass.

There he was assigned to the Second Engineers Special Brigade, which hopped and skipped across New Guinea and into the Philippines. The unit also made history at Buna, Finschhafen Gulf, Hollandia, and Leyte. Brockett wound up his military service by flying into Tokyo with the first occupation forces. He was promoted to colonel in the spring of 1945, but has since severed his army connections.

He returned to Gulf as staff engineer in the Fort Worth division and was made assistant superintendent of production in 1948. A year later he was transferred to the general offices at Pittsburgh as staff engineer in the production department. It was in late 1952 that he made his move to Mene Grande, where he remained until elected to his new position.

After leaving school, Del began doing his relaxing on the golf course. By playing regularly, he shoots in the high-70's. However, he confesses that when he doesn't play often he's more apt to be in the 80's.

His biggest concentration, however, remains his job. The Houston division is made up of East Texas, Texas Gulf Coast, Louisiana, Arkansas, Mississippi, Alabama, Georgia, and Florida, so it looks as if he'll be lucky if he keeps that golf score out of the 90's.

Frank Earl Eckert, Jr., petroleum engineer with Gulf Refining Co. in the production department at Lafayette, La., has been transferred to the gas and gasoline department at Krotz Springs, La.

Ralph Will has been elected president of Alberta Gas Trunk Line Co., Ltd. **R. J. Dinning** was named chairman of the board, and **Vern Taylor** was appointed vice president. Other board members are **N. E. Tanner, G. E. Church, Austin Brownie,** and **Carl Jones.**

R. R. Strand has been named manager of the western segment of Service Pipe Line Co.'s new 625-mile pipeline between Fort Laramie, Wyo., and Freeman, Mo. Strand, who will headquarter at Casper, Wyo., will manage the segment from Fort Laramie to the

R. R. STRAND

C. A. CHILDERS

Kansas line. **C. A. Childers** has been named manager of the eastern half of the line. Childers will headquarter in Wichita.

Arthur A. Lockhart, former geologist and geophysicist with Superior Oil Co. at Ada, Okla., has joined Envoy Petroleum Co., of Long Beach, as treasurer. Lockhart also will conduct research for the West Coast firm.

George H. Galloway, division manager of the Canadian division of Stanolind Oil & Gas Co., has been elected to the board of directors of the company. Galloway, who has been in Canada since March 1952, is in charge of the company's exploration and production activities there. The firm is presently developing its holdings in Pembina field, where it estimates 600 wells may be required to fully develop the Stanolind acreage. Galloway has been with Stanolind since 1940.

George A. Wilson has been named field superintendent in charge of Stanolind Oil & Gas Co.'s new area office at Brush, Colo. He formerly held a similar job at Stanolind's Thermopolis, Wyo., office. **Gilbert P. Pickens,** intermediate geophysicist for Stanolind Oil & Gas Co., has been transferred from New Orleans to Oklahoma City.

PERSONALS

R. G. Zollars, engineer with Magnolia Pipe Line Co., has been transferred from the firm's Dallas office to Beaumont.

Thomas B. Mann, vice president and general manager of Great Lakes Transport Corp., a Pure Oil Co. affiliate, has joined Pure as manager of the company's marine division.

J. D. Horne has been promoted to production foreman at Riverton, Wyo., by British-American Oil Producing Co. Horne had been serving as junior petroleum engineer in Dallas before his promotion and transfer.

K. K. McMillin has been promoted by Humble Oil & Refining Co. to senior chemical engineer in the technical-service division at the company's Baytown, Tex., refinery.

Ward Austin, district geologist for Cities Service Oil Co. at Casper, Wyo., has been transferred to Dhofar, Arabia, as chief geologist there for Cities Service-Dhofar Oil Co. **Robert C. Millspaugh,** Fort Worth, replaces Austin. **J. A. McIntosh,** Bartlesville, Okla., has been named division staff geologist at Casper.

David E. Luddeke, former division foreman of Pan American Pipe Line Co.'s Tomball, Tex., district, has been transferred to Pan Am's northern division headquarters at Longview, Tex. **Gilbert Rice,** district foreman formerly in charge of the company's Quitman, Tex., district, has replaced Luddeke at Tomball.

Karl A. Mygdal, assistant exploration manager of Pure Oil Co., has been promoted to geological representative in charge of the firm's Calgary office. **K. Stewart Cronin,** former exploration manager of Pure's southwestern producing division at Tulsa, became assistant exploration manager at Chicago headquarters. **John J. Collier, Jr.,** former division geologist at Tulsa, succeeds Cronin.

W. P. Williams and **Ray J. Thompson, Jr.,** have joined Gulf Coast Leaseholds at Houston. Williams, a petroleum engineer, has recently been serving as resident manager for Falcon Petroleum Corp. in El Mene, Venezuela. Thompson had been serving as a geologist with American Republics Corp. before he joined Gulf Coast. The company is preparing to drill nine wildcats on 55,000 acres it holds in a six-county area south of Austin, Tex.

A.A.P.G. Plans for Its First New York Meeting

When the American Association of Petroleum Geologists holds its annual meeting March 28-31, it will be the first time the group has ever convened in New York City. The meeting will be held jointly with the Society of Exploration Geophysicists and Society of Economic Paleontologists and Mineralogists. The theme will be "The Habitat of Oil in the Sedimentary Basin." Many of the papers will deal with foreign developments. Members of the planning committee, seated left to right, are Mrs. Pearle L. Blackman, Standard Oil Co. (N.J.), adviser to the technical program committee; Robert E. King, American Overseas Petroleum, Ltd., vice chairman of the general committee; G. M. Knebel, Jersey Standard, general chairman, and president elect of the A.A.P.G.; Mrs. Marion Jagels, Jersey Standard, committee secretary; and Brooks F. Ellis, New York University, S.E.P.M. chairman. Standing left to right, L. G. Weeks, Jersey Standard, chairman of the technical program committee; E. W. Ellsworth, A.A.P.G. Tulsa headquarters staff; Carroll E. Cook, Jersey Standard, chairman of the finance committee; C. B. Hunt, Washington, executive director, American Geological Institute; Donald M. Davis, Chicago, Pure Oil Co., general chairman for the 1956 meeting in Chicago; Lyman C. Reed, Standard-Vacuum Oil Co., chairman of the technical equipment committee; and Bruce R. Wood, American Overseas Petroleum, adviser to the publicity and printing committee.

C. O. REEDER

C. O. Reeder has been promoted to manager of Continental Oil Co.'s transportation department with headquarters at Ponca City, Okla. He succeeds **Paul H. Kuhns,** who retired. Reeder is a 34-year veteran of Conoco's transportation department.

B. J. Duffy has been promoted to assistant superintendent in charge of all design, economics, and other chemical engineering work at the Sugar Creek, Mo., research laboratory of Standard Oil Co. (Ind.). A graduate of Massachusetts Institute of Technology, he joined Standard of Indiana at Sugar Creek in 1948 and was promoted to group leader in 1954. **L. V. Sorg,** former group leader, has been promoted to chief chemist in charge of research, analytical, and inspection activities at the Sugar Creek laboratory. Sorg is a graduate of University of Kansas and of University of Kansas City. He joined the company in 1930. **T. L. Gore,** who started at Sugar Creek in 1951, has been advanced to group leader. He is a graduate of University of Kansas.

V. A. Bellman, vice president and director of marketing for General Petroleum Corp., Los Angeles, will transfer to New York February 15 as domestic marketing manager of Socony-Vacuum Oil Co., Inc., parent company of General Petroleum. **John C. Sample** will succeed Bellman.

E. W. BERLIN

E. W. Berlin has been named general representative by Standard-Vacuum Oil Co. for its operating subsidiaries in Indonesia. He will be stationed at Djakarta and will be in charge of Stanvac's exploration, producing, refining, marine, and pipeline transportation, and sales activities in the country. Berlin is former manager of the company's pro-

PERSONALS

ducing department at its New York City headquarters. He succeeds **G. L. McCoy** who will be reassigned. McCoy will tour Stanvac operating areas in Indo-China, Malaya, Thailand, and other Far East countries before being reassigned.

Dale C. Olson, former petroleum engineer with Continental Oil Co. at Oklahoma City, has been promoted by the company to district petroleum engineer at Griffin, Ind.

G. R. BRYANT

George R. Bryant, vice president of The Texas Co. the past 4 years, has resigned to become president of Jefferson Chemical Co., Inc. He succeeds **P. M. Dinkins,** president of Jefferson Chemical since 1946. Dinkins is retiring as president but will continue as a consultant to Jefferson Chemical, which is owned

C. B. BARRETT

S. C. BARTLETT

jointly by American Cyanamid Co. and The Texas Co. **Claud B. Barrett** has been named vice president of The Texas Co. at Houston to succeed Bryant. He had been vice president-sales with headquarters in New York since September 1953. **S. C. Bartlett,** general sales manager, was elected vice president to succeed Barrett.

H. S. Conway and **R. A. Dinerstein** have been named section leaders in the analytical research division of Standard Oil Co. (Ind.) at its Whiting, Ind., laboratories. Other changes announced at Whiting are **J. E. Barney II, F. J. Piehl,** and **J. C. Winters,** appointed group leaders; **J. G. Tolpin,** named technical associate in the information development division; **W. A. Proell,** appointed section leader responsible for work on solid-rocket propellants; **K. W. MacFie,** promoted to project superintendent at the Seymour, Ind., laboratory, and **N. J. Bowman,** named group leader at the Seymour laboratory.

Aaron L. Colvin, former land-department manager of Delhi Oil Corp. and vice president of Ked Royalty Corp., has joined Byrd Oil Corp., Dallas, as executive vice president and manager of the land department. Colvin entered the oil business 25 years ago in the production and pipeline departments of the Gulf organization. He has served since with Cities Service Oil Co., Danciger Oil & Refining Co., Southern Production Co., and Delhi.

C. O. Hopper, district superintendent for the Edmonton area office of Stanolind Oil & Gas Co., has been named district superintendent for the newly created Alberta district. **C. F. Rakestraw** has been promoted to field superintendent for the newly established Pembina area. Before his promotion, Rakestraw was serving as a production foreman in the Edmonton area. Other changes announced by Stanolind in Canada include: **H. W. Hinkle, Jr.,** former field engineer in the Edmonton area, named district engineer in the Alberta district; **J. N. Bowman,** tool pusher, will continue to supervise drilling in the Edmonton area; **J. H. Larson,** former field engineer for Stanolind at Sweetwater, Tex., has been named field engineer in the Pembina area; and **W. M. Bogert,** who has been farm boss in the Edmonton area since April 1954, has been made production foreman for the Pembina area.

Dr. R. L. Milner, chief geologist of Tide Water Associated Oil Co. in Saskatchewan, has been elected president of the Saskatchewan Geological Society for 1955. Others elected are **P. J. W. Wood,** Imperial Oil, Ltd., vice president; **A. L. Flood,** Canadian Superior Oil of California, Ltd., secretary-treasurer; **B. L. Smith,** Sun Oil Co., business manager; and **H. D. Fox,** Sohio Petroleum Co., program chairman.

A. F. Smith, veteran of 28 years of service in the pipeline industry, has been named division master mechanic in the Chicago, Ill., division by Standard Oil Co. (Ind.). Smith served as superintendent of the Rochelle, Ill., district before his promotion. Other changes announced by Standard Indiana in its products-pipeline division of its supply and transportation department include: **Dwight Browning,** named district superintendent of the Rochelle district, succeeding Smith; **D. A. Gayer,** named superintendent of the Twin Cities, Minn., terminal, replacing Browning; and **L. D. Stratton,** named terminal superintendent at Ottumwa, Iowa, succeeding Gayer.

Clyde Marquis, geologist with Humble Oil & Refining Co., has been transferred to Grand Isle, La., from Kingsville, Tex.

Edward B. Wasson has been named division geologist for Cosden Petroleum Corp. in the Rocky Mountain area. Wasson, a graduate of Princeton and Stanford universities, had been serving with The California Co. as division geophysicist in Denver before going with Cosden.

Charles E. Spahr, vice president and assistant to the president of Standard Oil Co. (Ohio), has been elected executive vice president of the company. Spahr has been with Sohio since 1939 except for service during World War II. During his Army service he supervised construction of a 570-mile products pipeline built in the India-Burma theater of operations. He became vice president in charge of the transportation department for Sohio in 1950. Spahr will continue his duties as assistant to the president.

DEATHS

G. F. Vossler, 86, veteran New York, Kansas, and Oklahoma oil producer, died recently at his home in Osawatomie, Kans. Vossler began his career in New York in 1900 and moved to Oklahoma 5 years later. He was a pioneer in water-flooding operations and on May 16, 1940, his success in Miami County, Kansas, was featured in The Oil and Gas Journal. Vossler was active until he retired in 1950.

John Blythe Halton Henderson, 49, prominent Dallas oil man and civic worker, died recently at his home in Dallas after suffering a heart attack. Henderson, a graduate of Rice Institute, was president of Survey Drilling Co.

Bill Vardiman, 40, driller for the Cactus Drilling Co., was killed February 7 when runaway cables struck him at the Zachary State No. 2 well 22 miles southwest of Maljamar, N. M.

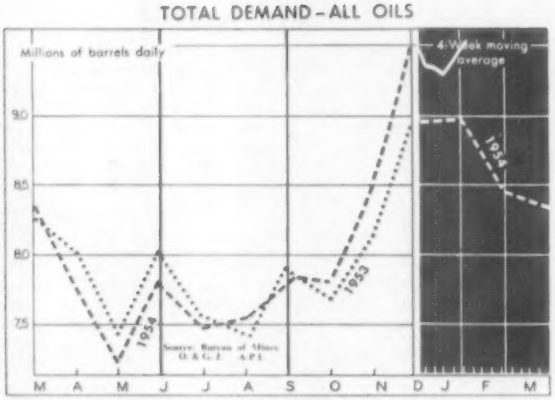
Andrew Krow, 82, president of White Krow Oil Co., died February 7 at his home in Ralston, Okla.

Latest Figures . . . Industry Trends

A QUICK LOOK AT THE HIGHLIGHTS

	LATEST WEEK	Change from WEEK AGO		Change from YEAR AGO	
Production	6,739,100	UP	49,825	UP	405,935
Crude stocks	259,702,000	UP	2,277,000	DOWN	8,194,000
Completions	1,047	UP	79	UP	142
Refinery runs	7,418,000	UP	16,000	UP	539,000
Gasoline stocks	171,331,000	UP	1,719,000	UP	1,275,000
Distillate stocks	82,001,000	DOWN	7,031,000	UP	3,987,000
Four-product stocks	324,302,000	DOWN	7,411,000	UP	9,676,000
Total imports	1,297,900	DOWN	247,300	UP	160,000

TOTAL DEMAND – ALL OILS



Distillate-Fuel Demand In January Increased Very Little Over 1953

TOTAL demand for distillate and kerosine for the heating season through January has shown a near-normal increase over the same period last year, but the showing in January has been poor.

Kerosine demand for the 4-week period ended January 28 was less than the January average last year. The 4-week average this year was 563,000 bbl. daily or 7.0 per cent less than actual total for January 1953.

Part of the poor showing for kerosine may have been due to irregular movement to jobbers, but a 7.0 per cent drop cannot be explained on this basis. For the October-January period kerosine demand just broke even with the same period last winter at a daily average of only 476,000 bbl.

Distillate-fuel demand averaged 2,488,000 bbl. daily in the first 4 weeks of January compared with 2,471,000 bbl. daily for the full month last year. This represents a gain of only 0.7 per cent.

Residual fuel was up in January compared with last year but down 0.5 per cent for the heating season to date.

The small increase in distillate demand combined with the decrease for kerosine results in a net loss for total middle distillate in January amounting to 0.8 per cent.

This poor showing by burning oils in January is reflected in stock changes for the month. At the end of December, middle-distillate stocks were 3,120,000 bbl. less than a year earlier. On January 28, current stocks were 8,320,000 bbl. above last year. This represents a net shift of 11,440,000 bbl. toward an undesirable stock position at the end of the season.

January 1954 was a very good heating-oil month—the first month with middle distillate above 3,000,000 bbl. daily—but most suppliers expected some gain over that record this year.

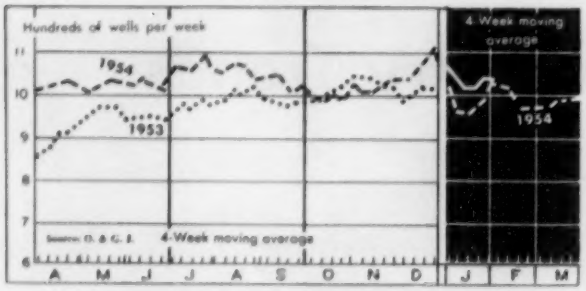
This lag in heating-oil demand has resulted in some loss of strength by kerosine and distillate markets. Very little open-market activity in distillate fuels was reported for the New York Harbor area in the first week of February. There is some indication that quoted prices for kerosine can be shaded slightly in areas of the East Coast.

The free period for storage of burning oils on the Great Lakes Pipe Line ended January 31. Most of the suppliers were able to move out the distillate they had put in storage last summer and early fall, but some material was subject to demurrage in the first week of February.

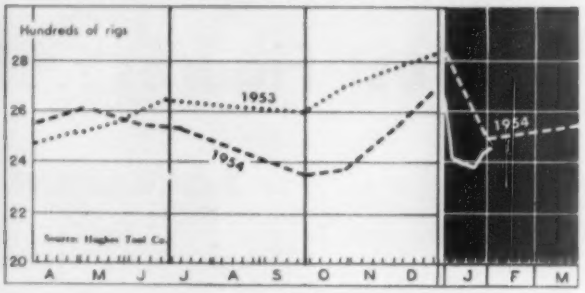
Despite near-normal movement out of pipeline terminals, some distillate has been offered at reduced prices to cut down demurrage costs. This material represents only a small part of normal movement but it is available at a reduction of 0.125 cent a gallon.

Natural gasoline dropped 0.5 cent a gallon, starting in Texas on February 8. The firmer market in Oklahoma prevented an immediate drop in Group 3. The Group 3 cut was effective February 9.

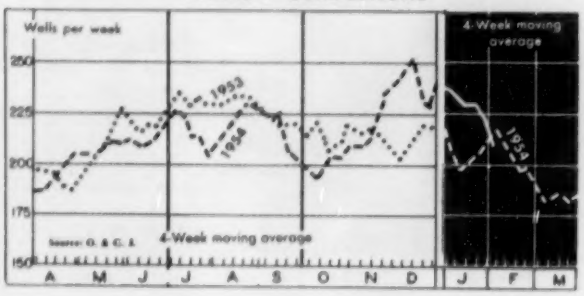
TOTAL COMPLETIONS



ROTARY RIGS OPERATING IN UNITED STATES



WILDCAT COMPLETIONS



ACTIVE ROTARY RIGS

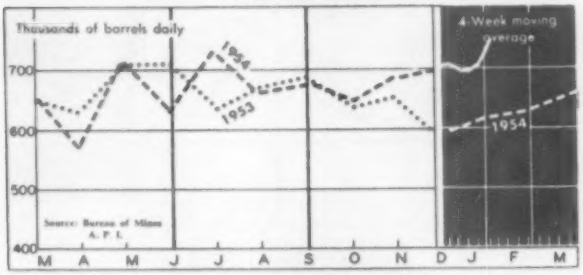
Area—	2-7-55	Change from 1-31-55	Change from 2-8-54
Gulf Coast	529	4	21
N. and W. Texas-New Mexico	817	25	36
Arkansas-N. Louisiana-E. Texas	170	8	7
Oklahoma	299	—3	—89
Kansas-S. Nebraska	170	—10	24
Illinois-Eastern	132	1	15
Rocky Mountain	208	8	—41
Pacific Coast	140	—5	—12
Total United States	2,465	28	—39
Western Canada	205	12	57

WEEKLY WELL COMPLETIONS . . .WEEK ENDED FEBRUARY 5, 1955

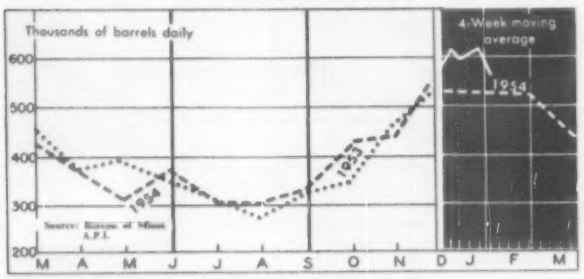
	Total of all wells: Comp.	Oil	Gas	Dry	Footage	Cum. 1955	Cum. 1954	Wildcat completions and discoveries: Oil	Dist.	Gas	Dry	Total	Cumulative total, 1955: Oil	Dist.	Gas	Dry	Total
Ala.-Ga.-Fla.	0	0	0	0	0	12	11	0	0	0	0	0	0	0	0	11	11
Arkansas	7	4	0	3	31,167	44	53	1	0	0	2	3	4	0	0	10	14
California	47	33	2	12	204,807	182	246	2	0	0	5	7	2	0	1	35	38
Colorado	19	6	0	13	102,105	125	97	2	0	0	10	12	6	0	4	62	72
Illinois	64	35	0	29	150,147	401	277	0	0	0	10	10	10	0	0	44	54
Indiana	10	3	0	7	15,712	60	80	0	0	0	3	3	2	0	0	16	18
Kansas	105	53	9	43	369,004	495	404	4	0	1	16	21	12	0	3	92	107
Kentucky	17	10	1	6	28,118	125	101	1	0	0	3	4	6	0	1	21	28
Louisiana	54	35	6	13	327,461	379	319	1	0	0	9	10	13	6	4	36	59
North	31	20	5	6	85,911	216	161	0	0	0	5	5	2	2	1	15	20
South	23	15	1	7	241,550	163	158	1	0	0	4	5	11	4	3	21	39
Michigan	11	3	0	8	35,665	67	66	0	0	0	5	5	1	0	0	29	30
Mississippi	4	3	0	1	32,058	35	27	0	0	0	0	0	0	0	0	12	12
Montana	6	2	0	4	28,508	37	23	0	0	0	0	0	1	0	0	9	10
Nebraska	12	4	0	8	68,199	59	37	1	0	0	5	6	4	0	0	28	32
New Mexico	31	6	22	3	192,233	107	151	0	0	0	2	2	0	0	0	11	11
Northwest	22	0	21	1	67,499	35	48	0	0	0	1	1	0	0	0	3	3
Southeast	9	6	1	2	124,734	72	103	0	0	0	1	1	0	0	0	8	8
North Dakota	5	3	0	2	34,316	19	24	0	0	0	1	1	0	0	0	4	4
Ohio	50	25	5	20	107,880	127	91	0	0	0	1	1	0	0	2	5	7
Oklahoma	161	97	7	*57	529,264	739	877	7	2	0	9	18	14	2	2	62	80
Pennsylvania-New York	33	10	9	*14	72,751	172	257	0	0	0	0	0	0	0	3	0	3
Texas	377	269	9	99	1,674,424	1,820	1,695	21	0	1	63	85	73	5	12	364	454
Southwest (1 & 4)	73	53	5	15	295,226	274	246	6	0	0	11	17	13	1	3	53	70
Gulf Coast (2 & 3)	43	19	1	23	297,576	254	264	1	0	1	17	19	6	4	7	67	84
East (5 & 6)	28	18	1	9	135,270	126	74	2	0	0	6	8	5	0	0	37	42
North Central (7-B & 9)	110	77	0	33	325,651	570	625	10	0	0	16	26	35	0	0	129	164
West (7-C & 8)	99	82	0	17	541,395	485	409	2	0	0	12	14	14	0	1	76	91
Panhandle (10)	24	20	2	2	79,306	111	77	0	0	0	1	1	0	0	1	2	3
Utah	0	0	0	0	0	5	8	0	0	0	0	0	0	0	0	4	4
West Virginia	19	1	16	2	52,986	69	49	0	0	0	0	0	0	0	2	0	2
Wyoming	13	3	0	10	78,959	97	161	0	0	0	8	8	1	0	1	24	26
Miscellaneous (S. D., Nev.)	2	0	0	2	7,642	5	6	0	0	0	2	2	0	0	0	5	5
Total United States	1,047	605	86	356	4,143,406	5,181	5,060	40	2	2	154	198	149	13	35	884	1,081
Total previous week	968	544	68	356	3,963,803			32	2	10	164	208	109	11	33	730	883
Total February 6, 1954	905	528	64	313	3,813,522			30	4	10	152	196	151	16	37	927	1,131

Service wells included: *8.

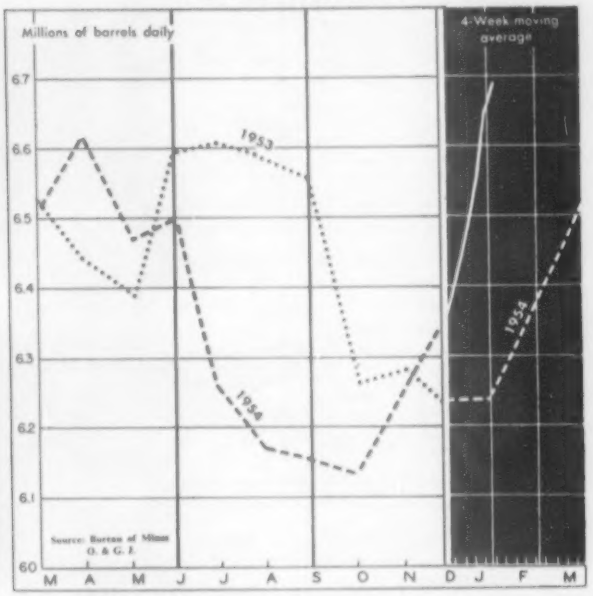
CRUDE IMPORTS



PRODUCT IMPORTS



CRUDE-OIL PRODUCTION

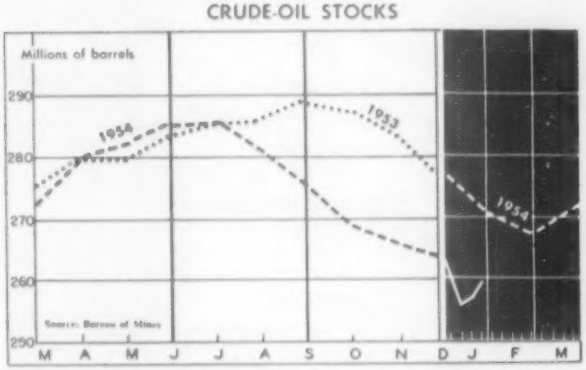


DAILY AVERAGE PRODUCTION FOR WEEK

	February 5			Jan. 29
	Crude oil	Lease condensate	Total	total
Alabama	4,200		4,200	4,200
Arkansas	74,200	500	74,700	73,900
California	965,600		965,600	966,900
Colorado	140,100		140,100	140,800
Eastern	51,900		51,900	51,900
Florida	1,450		1,450	1,450
Illinois	206,300		206,300	201,200
Indiana	30,300		30,300	29,800
Kansas	332,700		332,700	334,900
Kentucky	40,900		40,900	39,400
Louisiana	644,700	55,900	700,600	689,250
North	105,850	2,900	108,750	107,250
South	538,850	53,000	591,850	582,000
Michigan	32,900		32,900	33,400
Mississippi	90,675	4,025	94,700	94,475
Montana	40,900		40,900	40,100
Nebraska	26,500		26,500	25,600
New Mexico	216,825	4,075	220,900	216,325
North Dakota	28,800		28,800	28,100
Oklahoma	543,900		543,900	528,400
Texas	2,872,150	53,300	2,925,450	2,913,975
Dist. 1	48,000	500	48,500	46,450
Dist. 2	149,000	8,100	157,100	157,075
Dist. 3	448,600	25,075	473,675	471,850
Dist. 4	252,000	6,075	258,075	258,175
Dist. 5	48,875	550	49,425	51,225
Dist. 6	123,575	5,600	129,175	129,200
East Texas field	237,925		237,925	240,500
Dist. 7-B	140,350	50	140,400	140,825
Dist. 7-C	181,550	4,700	186,250	184,150
Dist. 8	964,850	2,000	966,850	959,925
Dist. 9	191,850	575	192,425	189,575
Dist. 10	85,575	75	85,650	85,025
Utah	4,100		4,100	4,700
Wyoming	271,800		271,800	270,200
Others	‡400		‡400	300
Total U. S.	6,621,300	117,800	**6,739,100**	6,689,275
Change from previous week, up			**49,825**	
Canada	†293,550		†293,550	†328,950
Total U.S. Production January 1-February 5			239,560,950 bbl.	
Same period last year (crude plus cond.)			*225,321,415 bbl.	

*Includes 3,586,200 bbl. condensate. †Week ended previous Monday. ‡S. D. 200, Nev. 200.

CRUDE-OIL STOCKS



CRUDE-OIL STOCKS BY STATES OF ORIGIN*

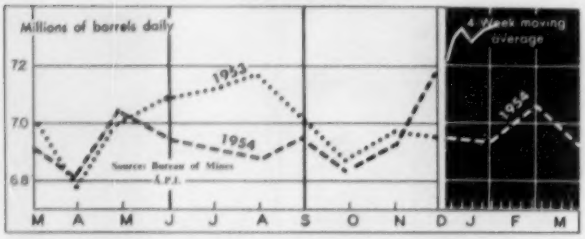
(Thousands of barrels)

	Jan. 29, '55	Jan. 22, '55	Jan. 30, '54
Pennsylvania Grade	2,961	2,947	2,531
Other Appalachian	1,787	1,641	1,771
Illinois, Indiana, Michigan	11,263	10,642	11,667
Nebraska, North Dakota	2,029	1,917	(‡)
Kansas	8,233	8,592	10,006
Oklahoma	23,808	24,896	27,077
Arkansas	3,226	2,915	3,317
Louisiana	15,057	14,303	15,218
North	2,400	2,315	2,786
South	12,657	11,988	12,432
Mississippi	3,068	3,104	3,551
New Mexico	8,004	7,726	8,259
Texas	118,003	118,265	125,720
East Texas proper	10,133	9,870	10,898
West Texas	50,939	51,182	54,381
Texas Gulf	24,323	24,578	26,073
Other Texas	32,608	32,635	34,368
Wyoming	14,678	14,616	13,884
Other Rocky Mountain	5,936	5,639	3,110
California	31,030	30,777	33,494
Foreign	†10,619	9,445	10,663
Total	259,702	257,425	270,268

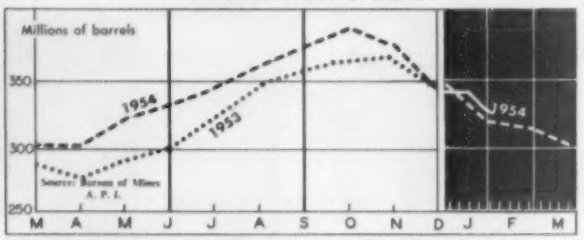
*Bureau of Mines. †Includes 3,029,000 bbl. in California. ‡Included with Kansas.

CURRENT STATISTICS — REFINING

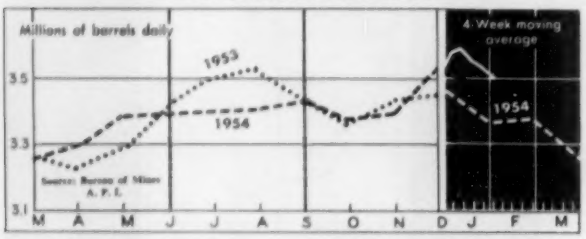
REFINERY RUNS



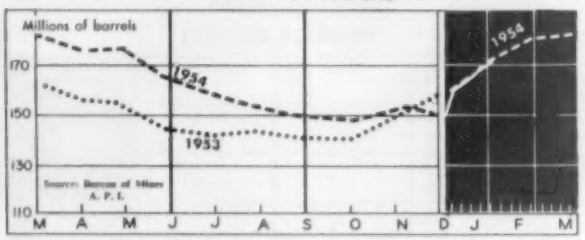
FOUR-PRODUCT STOCKS



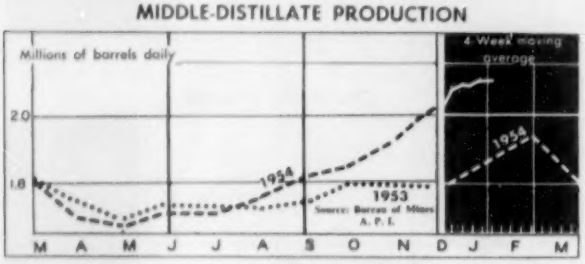
GASOLINE PRODUCTION



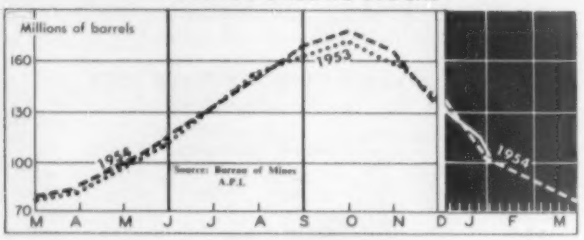
GASOLINE STOCKS



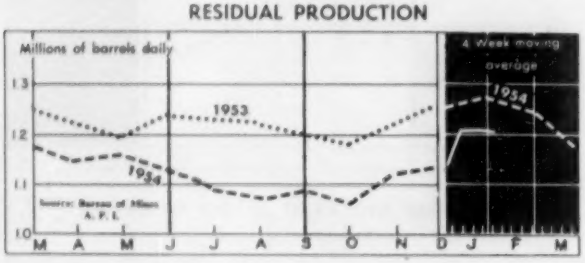
MIDDLE-DISTILLATE PRODUCTION



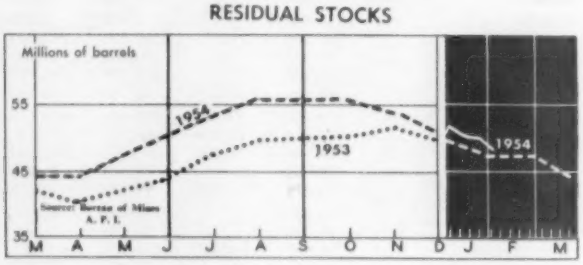
MIDDLE-DISTILLATE STOCKS



RESIDUAL PRODUCTION



RESIDUAL STOCKS



A.P.I. REFINERY REPORT, FEBRUARY 4

(Excludes all jet-fuel components)

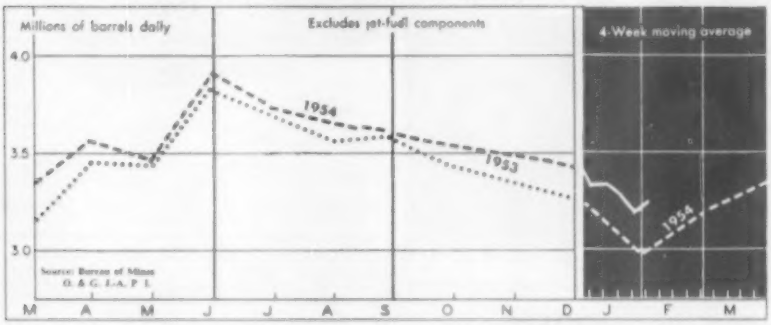
(Thousands of barrels)

District—	Daily avg. runs	Daily average production Gaso.*	Kero.	Dist.	Resid.	Stocks‡ Gaso.†	Kero.	Dist.	Resid.	Bureau of Mines, February 1954 Daily avg. runs	Daily average production Gaso.*	Kero.	Dist.	Resid.
East Coast	1,136	445.3	45.2	305.7	259.3	34,034	9,133	29,264	8,322	1,017	412.2	46.1	265.9	231.2
Appalachian:														
District 1	90	40.8	6.0	20.3	6.1	4,917	546	1,828	383	117	52.6	5.9	28.2	15.7
District 2	100	49.9	9.0	19.3	17.3	2,374	336	631	232	96	50.7	6.8	18.7	15.9
Ind., Ill., Ky.	1,353	674.9	77.6	311.6	170.4	38,090	6,117	14,324	2,985	1,334	701.9	83.9	264.5	192.7
Okla., Kans., Mo.	693	381.7	20.3	172.2	53.0	18,134	1,395	9,235	1,225	594	346.2	16.9	139.1	46.2
Inland Texas	258	179.4	13.1	37.0	22.1	6,192	331	1,321	1,307	251	175.6	12.5	42.0	29.3
Texas Gulf Coast	1,841	790.1	141.3	491.3	232.3	24,355	2,613	8,432	4,491	1,701	741.4	140.7	410.1	227.6
La. Gulf Coast	593	286.6	56.4	177.4	45.6	11,364	1,536	3,492	1,238	581	269.8	80.1	149.3	45.7
N. La. and Ark.	88	31.9	8.7	17.1	6.7	4,348	618	1,055	166	87	36.9	8.6	19.7	7.1
Rocky Mountain:														
New Mexico	16	10.0	1.0	2.9	2.7	177		87	28	19	11.9	.7	3.1	2.9
Other Rocky Mt.	256	116.4	2.0	67.4	42.6	7,170	197	2,106	820	245	125.7	4.6	55.8	43.0
California	994	451.3	6.1	169.1	349.3	20,176	378	10,226	26,573	1,026	440.5	5.4	148.5	383.9
February 4, 1955	7,418	3,458.3	386.7	1,791.3	1,207.4	171,331	23,200	82,001	47,770	7,068	3,365.4	412.2	1,544.9	1,241.2
January 28, 1955	7,402	3,506.6	389.1	1,702.9	1,195.6	169,612	24,532	89,032	48,537					
February 6, 1954	6,879	3,398.1	367.6	1,562.0	1,221.3	170,056	20,671	78,014	45,885					

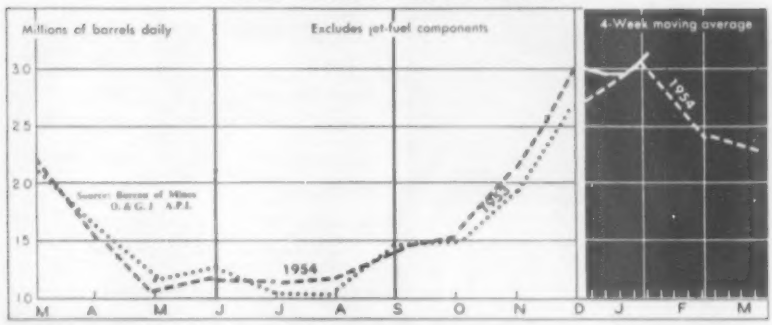
*At refineries including natural blended. †Finished and unfinished. ‡At refineries, bulk terminals, in transit, and in pipelines.

CURRENT STATISTICS — DEMAND

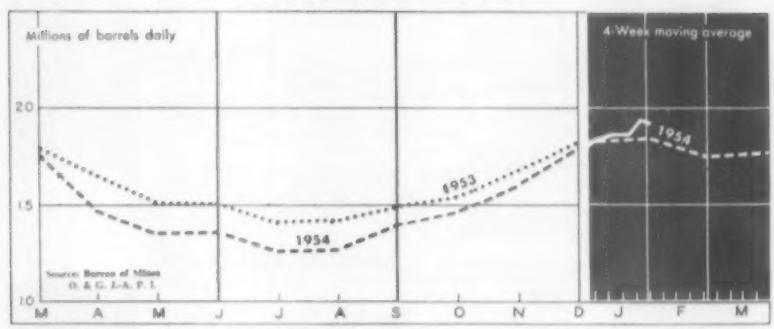
TOTAL GASOLINE DEMAND



TOTAL MIDDLE-DISTILLATE DEMAND



TOTAL RESIDUAL DEMAND



REPRESENTATIVE QUOTATIONS

Spot-market quotations of leading suppliers as of February 9, 1955. Prices are in cents per gallon, except for residual in dollars per barrel and wax in cents per pound.

GASOLINE, KEROSINE, AND FUEL OILS

	Mid-Continent Group 3	New York Harbor (barge)	Texas Gulf Coast
Regular gasoline	10.25-11	11.25-12	10.50-10.75
Premium gasoline	11.25-12	13-13.75	11.50-11.75
42-44 w.w. kerosine	9.625-9.875	10.7	9.5-9.75
No. 2 straw fuel oil	8.75-9.0	9.95	9.0-9.25
No. 6 residual	$1.50-1.60	$2.35-2.45	$1.85-2.00

NATURAL GASOLINE

	Group 3	North Texas	N. La.
Grade 26-70	5.0	4.5	4.75
Grade 18-55	6.0	5.5	5.75

LUBRICATING OILS

Mid-Continent

150-160 vis., D bright stock, 0-10 pp.	18
200 vis., No. 3 neutral, 0-10 pp.	13.25

WAX

Mid-Continent

132-134 A.M.P.	6.0

• Natural gasoline prices dropped 0.5 cent a gallon. The cut first came in Texas with reduction effective February 8. Group 3 price was lowered by the same amount on February 9. Group 3 burning oils are off 0.125 cent on the low, but cold weather will help the market.

PRODUCTION AND DEMAND—MAJOR PRODUCTS

(Thousands of barrels daily)

	Refinery prod.	Total demand
Gasoline:		
Four weeks ended 2-4-55	3,500	3,230
November 1954	3,428	3,505
January 1954	3,354	2,985
February 1954	3,365	3,182
Middle distillate:		
Four weeks ended 2-4-55	2,130	3,156
November 1954	1,976	2,246
January 1954	1,857	3,076
February 1954	1,957	2,417
Residual fuel:		
Four weeks ended 2-4-55	1,204	1,909
November 1954	1,120	1,613
January 1954	1,271	1,831
February 1954	1,241	1,753

CRUDE PRICES

GRAVITY SCHEDULE

	Signal Hill, Calif.*	Okla-homa, Kansas	Gulf Coast Tex.†	West Tex.‡
14-14.9	$1.87			
15-15.9	1.93			
16-16.9	1.99			
17-17.9	2.05			
18-18.9	2.11			
19-19.9	2.18			
20-20.9	2.24	$2.50		$2.37
21-21.9	2.30	2.52		2.39
22-22.9	2.37	2.54		2.41
23-23.9	2.45	2.56		2.43
24-24.9	2.53	2.58	$2.91	2.45
25-25.9	2.61	2.60	2.93	2.47
26-26.9	2.69	2.62	2.95	2.49
27-27.9	2.76	2.64	2.97	2.51
28-28.9	2.83	2.66	2.99	2.53
29-29.9	2.91	2.68	3.01	2.55
30-30.9	2.97	2.70	3.03	2.57
31-31.9	3.04	2.72	3.05	2.59
32-32.9	3.12	2.74	3.07	2.61
33-33.9		2.76	3.09	2.63
34-34.9		2.78	3.11	2.65
35-35.9		2.80	3.13	2.67
36-36.9		2.82	3.15	2.69
37-37.9		2.84	3.17	2.71
38-38.9		2.86	3.19	2.73
39-39.9		2.88	3.21	2.75
40 and above		2.90	3.23	2.77

*Standard Oil Co. of California. †Upper Texas Gulf Coast. ‡Sour. Includes New Mexico Permian.

Effective dates: California, February 16, 1953; east of California, June 15, 1953; Pennsylvania Grade, January 21, 1955.

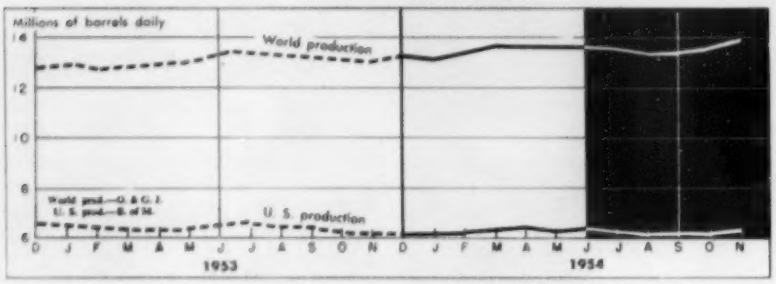
FLAT CRUDE PRICES

Representative posted schedules per barrel.

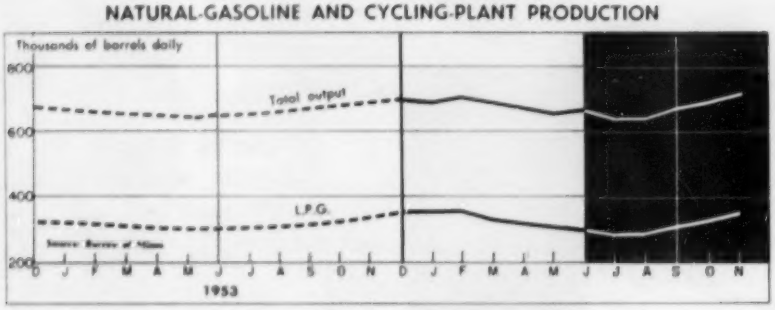
Louisiana:	
Cotton Valley (distillate)	$3.00
Cotton Valley (Holloway crude)	2.95
Texas:	
East Texas	2.90
Chapel Hill	2.83
Conroe	3.13
Van	2.73
Pennsylvania Grade:	
Bradford	3.50
Middle District	3.37
Southwest Pennsylvania	3.08
West Virginia	2.97
Buckeye Grade	2.91
Zanesville Grade	2.72
Illinois Basin	2.90-2.95

CURRENT STATISTICS — SELECTED MONTHLY DATA

CRUDE-OIL PRODUCTION



NATURAL-GASOLINE AND CYCLING-PLANT PRODUCTION



PRODUCTION AT NATURAL-GASOLINE AND CYCLING PLANTS

(Thousands of barrels daily)

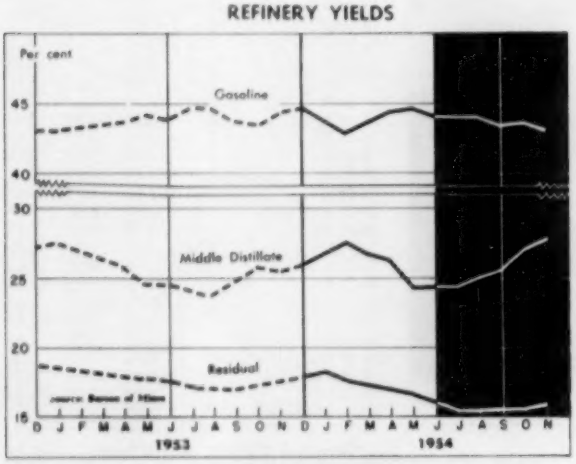
Month—	L.P.G.	Total
November 1954	360	723
October 1954	332	692
September 1954	315	676
March 1954	332	682
November 1953	330	683

CRUDE PRODUCTION

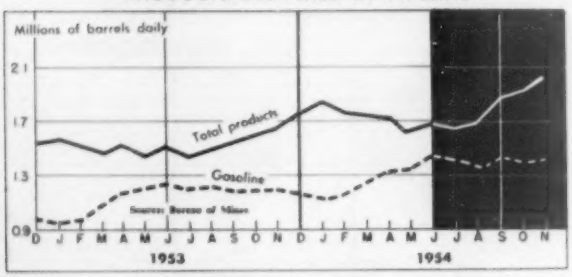
(Thousands of barrels daily)

Month—	U. S.	World
November 1954	6,346	13,934
October 1954	6,135	13,687
September 1954	6,151	13,432
March 1954	6,507	13,680
November 1953	6,277	12,962

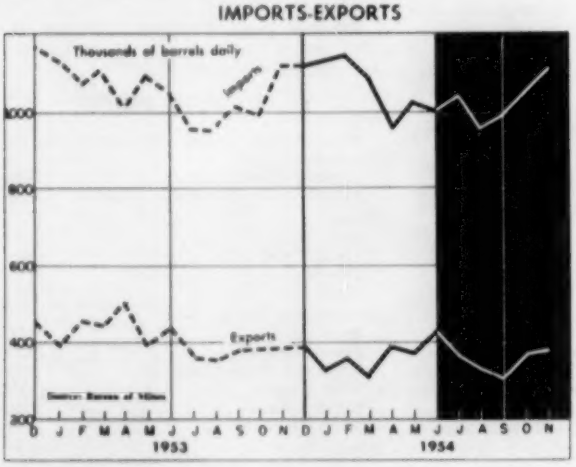
REFINERY YIELDS



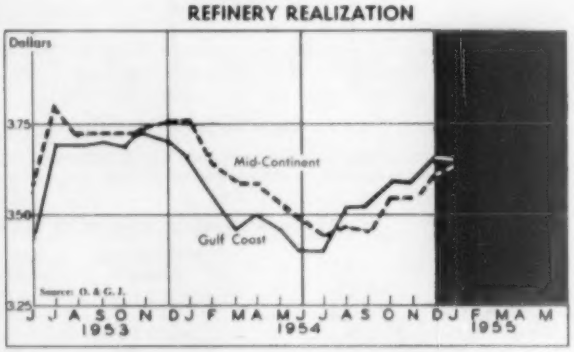
PRODUCTS DELIVERED BY PIPELINE



IMPORTS-EXPORTS



REFINERY REALIZATION



REFINERY REALIZATION

	Jan.* 1955	Dec.* 1954	Nov. 1954	Jan. 1954
Mid-Continent	$3.67	$3.61	$3.56	$3.76
Gulf Coast	3.68	3.64	3.59	3.67

*Preliminary.

Refinery realization is based on yields of major products and average spot prices of regular gasoline, kerosine, No. 2 fuel, and residual as published in The Oil and Gas Journal.

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FOR SALE EQUIPMENT

SALES and rentals of cable drilling and fishing tools, casing and equipment, from the Southwest's largest stock of used cable tools and oil field supplies. Degen Pipe and Supply Co., Tulsa, Oklahoma.

CORE DRILLS-URANIUM. Power core drills for all depths. New and used spudders, rotaries, well drilling equipment and supplies. Compressors for air operation. Pressey & Son, Pueblo, Colo.

WALKER-NEER 32. SPC. Complete with tools for top to bottom drilling, new lines, all in good condition. Call 96-92240 or write Wm. H. Bass R.R. 9, Jennings Lane, Evansville, Ind.

FOR SALE: Good used Pin & Pin Sucker Rods. A-1 Condition. 40,000'—¾" H&G Couplings. 20,000'—⅞" H&G Couplings. 30,000'—1" H&G Couplings. Prices on Application. Phone—wire—write, Sabine Pipe & Supply Company, P. O. Box 111, Kilgore, Texas. Phones 3094, 3095, 5533.

FOR SALE—Model 36-L Bucyrus-Erie Drill Trailer mounted Casing Tackle Strut, and Tool Crane. Write or call Mr. Jim Ronhausen, R.F.D. #22, Fairdale Cambridge, Ohio. Phone 3-4427.

DESULFURIZER

One 0.1 MM B. S. & B. skid-mounted desulfurizer capable of sweetening 100,000 cu. ft. of gas per day. Used short time. Located in West Texas. Contact Helmerich & Payne, F. F. Agee, 1st National Bank Bldg., phone 3-5104, Tulsa, or A. G. Post, Helmerich & Payne, McCamey, Tex.

FOR SALE—In Oklahoma City field one 30' x 86' x 12' sectional steel corrugated iron building, $1,750.00; one 30' x 40' x 10' DO., $750.00, both now erected. Contact T. P. Mace, Oklahoma City warehouse or Cities Service Oil, Patridge, Bartlesville, Oklahoma.

COMBINATION Rotary and Core Drill. Good condition. Will drill to 1500 feet and core to 2500 feet. Complete outfit, including Cementing Truck. Call Leslie Paris, JA-8-1377 or WI-2-5058. Oklahoma City, Okla.

USED EQUIPMENT

Two Franks Model 4000-TM Single Drum Well Servicing Units. Single Pole Mast. Truck Mounted.
Franks Model Super East Texas Single Drum Well Servicing Unit. Truck Mounted. Handles 4500' work.
Franks Model East Texas Single Drum Well Servicing Unit. Single Pole Mast. Truck Mounted. Handles 5000' work.
Two Cardwell Models KS Single Drum Well Servicing Unit. Single Pole Mast. Industrial engine. Mounted on tracks.

50/60 Ideco Skid Servicing Unit. Double Pole Mast. Mounted on International Tandem Truck.
Franks SAL 4500 Skid Rotary Rig Cummins Power, 96' Derrick. Located, Tulsa, Oklahoma.
O.C.S. Type 3 Servicing Unit mounted on 1942 Mack Truck. Located Odessa, Texas.

Write, Wire or Call

FRANKS MFG. CORPORATION
BOX 3218, WHITTIER STATION
TULSA, OKLAHOMA

FOR SALE EQUIPMENT

N-3 BREWSTER Double Drum Drawworks with one WAK Waukesha engine—Excellent condition, $7,500.00. Box H-617, The Oil and Gas Journal, Tulsa, Oklahoma.

FOR SALE—7,000 ft. 7" O.D. 26# Grade J-55 Range 2, 8 rd. thread New API Prime Casing, LT&C $2.10 per ft. F.O.B. cars, Pennsylvania location. The Buckeye Supply Company, 18 Harrison Street, Zanesville, Ohio.

FOR SALE: Three type 80 Cooper Gas Engine Compressors completely rebuilt. Two type 80 Cooper Compressors as is. One 100 H.P. Superior as is or rebuilt. One Clark 100 H.P. Gas Engine driven Compressor. W. S. Smith, 205 Thompson Bldg., Tulsa, Okla.

FOR SALE: At Tallant, Oklahoma, two 5' x 50' absorbers, 20 trays, 24" spacing 500# WP, peak design each 40,000 MCFD at 350 PSIG; oil rate 100-300 GPM, Min. and Max. Bought new 1947, taken out of service 1954. Price $8500.00 each, with fittings, standing. Full data upon request. Cities Service Oil, Patridge, Bartlesville, Oklahoma.

Gaso Duplex 4½" x 6" Power Pumps with Chrysler C-36 Engines, skid mounted, immediate delivery. Also Byron Jackson, Carter Centrifugal Units. Westinghouse 20-25-50 KW Generating Units.

H. H. COFFIELD
Attn.: W. H. ORR
Phones: 132—Rockdale, Texas
AT-3427—Houston, Texas

FOR SALE EQUIPMENT

FOR SALE: ENGINE—165 Hp. Climax Model R61, maximum continuous Hp. rating 126. Herndon Drilling Company, 421 Mayo Building, Tulsa, Phone 4-9700.

SALES AND RENTALS of Rotary and Cable tools. E. A. Kelly, Okla. City. 3128 S. E. 29th St. Box 861. JA 5-6407.

WILSON GIANT Single Engine Drawworks in good condition, complete with JL1335 Buda Engine and Parkersburg Hydromatic Brake, reasonably priced. Write Louisiana Iron & Supply Company, Box 966, Longview, Texas, or call Plaza 9-4421.

GASOLINE PLANT *FOR SALE*

Gasoline Plant, located in Brazoria County, Texas, shut down in January, 1954. Had been processing approximately thirty-three million feet of gas daily with absorber pressure approximately six hundred thirty pounds. Plant recovered Propane, Butane, Gasoline, Kerosene and Diesel Oil. Adequate storage tanks for all products. Drum Lead Blending Plant. Detailed inventory available upon request.

SOUTHERN PRODUCTION CO., INC.
P. O. Box 670, Ft. Worth, Texas

ANOTHER BRILL LIQUIDATION!

FORMER CONSUMERS COOPERATIVE REFINERY
LEVELLAND, TEXAS
(30 Miles West of Lubbock on Highway 290)

3'10" x 38" Vessel, 325# WP
5'3" x 38'6" Vessel, 90# WP, Chr. Lined
8—5000, 2000, 1200 bbl. Bolted Tanks
10—2000, 1000 bbl. Welded Tanks
6' x 58' x ⅜" Shell Fractionating Tower, chr. lined; built 1951, used 9 months.
6'6" x 55'; 6' x 27'; 5' x 27'; 3' x 49'; 30" x 35' Towers.
1800, (4)500 sq. ft. Adm Ht Exchangers.
600, 500 sq. ft. Chr. Steel Ht Exchangers.
200, 268, 730 sq. ft. Steel Reboilers.
1000, 750, 500, 300, 250 sq. ft. Steel Ht Exchangers.
BJ 5 Stage Ni. Chr. Centrifugal Pump, 400 GPM, 2100 ft. hd.
20—2", 3", 4" BJ Centrifugal Pumps XPF Motors.
15—Duplex Piston Pumps from 6" x 3½" x 6" to 14" x 6¾" x 12".
IR 13" x 7" x 14" Steam Driven Duplex Air Compressors.
3—Upshot Heater Stills, chr.-moly. Tubes
4—Water Tube Boilers—511, (3)205 hp.
Ethyl Lead Plant complete with Tank, Weigh Scale, Pumps, Meters, etc.
4-Spot Truck Loading Dock, built 1952, complete with Meters, pumps, etc.

Thousands of Feet 2", 4", 6" Pipe; unused 2", 4", 6" Pipe (Schedule 40, 80, 160) Unused 3" Boiler Tubes; 3", 3¼" chr. Still Tubing; Valves; Fittings; Return Bends; Hardware too numerous to mention.

Detailed Circular Upon Request.

BRILL EQUIPMENT COMPANY
4101 San Jacinto St., Houston 4, Texas. Locust 1351
New York Office: 2401 Third Ave., New York 51, N. Y. Cypress 2-5703

FOR SALE EQUIPMENT

FOR SALE—Horizontal Duplex Steam Pumps—10x8½x12—353 GPM—bronze fitted—max. discharge pressure 100 lbs.—8" suction—5" discharge—mfg. by American Marsh Co. Quantity available—NEW—Boston Metals Co. 313 E. Baltimore St., Baltimore 2, Md., Curtis 7-5050.

FOR SALE—At Oklahoma City 1 HB-218 125# MWP Coynco Stratube open cooling sections with 1" OD x 18 BWG x 20' long Admiralty metal tubes. Purchased new March, 1951, out of service September 1, 1954. Price $850.00. Used for absorption oil cooling. Cities Service Oil, Patridge, Bartlesville, Oklahoma.

USED HYDRAULIC DRILLS and Mayhew Model 1000—Gardner-Denver Pumps. Drills mounted on Fords and Internationals. Good condition. Price range from $3500.00 to $5500.00. 3820 N.W. 30th Street, Oklahoma City, Oklahoma. Phone Windsor 2-5597.

FOR SALE: 1—Beaird—Ingersoll-Rand packaged Compressor Plant, Type 6-JVG (165 H.P.) Heavy Duty, direct connected, 4-cycle, gas engine driven, single stage equipped with 3—4¼ x 9 compressor cylinders, three hand operated fixed volume pockets, two hand operated valve lifters, 20" O.D. 500# W.P. intake scrubber, air starting equipment and controls for automatic operation. Designed for intake pressure range 100# 250#, discharge pressure range 500#-600#. Delivery 3,480 MCF per day at 250# intake, 550# discharge. This plant has been in use less than 30 days and is located near Palestine, Texas. Box H-616, The Oil and Gas Journal, Tulsa, Oklahoma.

FOR SALE

Complete and modern refinery, either in whole or by units, as follows:

1. 6000 bbl. topping plant with Dubbs upshot heater. Two 8x50 fractionators, salt settlers, pumps, instruments, etc., for complete operation.
2. One Dubbs cracking unit complete with 2 coil upshot heater, reaction chamber.
3. One complete steam generating unit, consisting of 2 Springfield wt boilers, feed pumps, burners, fans, stock and instruments ready to operate; boilers 415 HP each.
4. Miscellaneous items connected with refinery operation; such as, pumps, tanks, vessels, fire equipment, etc.

CONTACT

W. T. Waggoner Estate,
Electra, Texas
J. O. WALKUP—Phone 3-225.

EQUIPMENT SPECIALS!

Columns: 8' x 28', 7' 6" x 56', 7' 4" x 70', 7' x 5' x 70', (2) 7' x 57' (400#), 7' x 26' SS, 6' x 53' SS, 6' x 63', 4' x 47', (250#), 2' x 75', 2' x 45' (250#).

Heat Exchangers:

(1) 1,800 sq. ft. (Adm.), (2) 1,125 sq. ft. (850 lb.), 1,000 sq. ft., 600 sq. ft. (Adm.), (5) 424 sq. ft. (Adm.), (5) 360 sq. ft., (4) 260 sq. ft.

60—Turbine and motor driven centrifugal pumps, SS & Steel, 1" x 1" to 8" x 8".

2—6-stage Pacific pumps 730 GPM.

2—Clark MA-4 150 BHP engines.

4 IR XVG-8 engines. Also 1 Clark RA-8.

Goulds 16" 10,500 GPM. Pump. 135 ft. hd.

Oliver Filters: 8' x 10', 5' 3" x 8'.

5' x 12', 4' x 6' Drum Flakers.

Lab. Petrochem Furnace.

5—300# Vessls: 10' x 35', 8' x 35', 7' x 30'.

10—10' x 40' Hor. Tanks.

Detailed circular upon request.

BRILL EQUIPMENT COMPANY

4101 San Jacinto St., Houston 4, Texas, Locust 1351
New York Office, 2401 Third Ave.,
Telephone Cypress 2-5703
Sell us your surplus equipment

FOR SALE EQUIPMENT

ONE 36-L Bucyrus-Erie Spudder with clean-out tools. Phone 982, Augusta, Kansas.

FOR SALE: 4600 ft. good 3½" modified drill pipe. Take all, 80c ft. Will trade for 5½" casing. F. H. Graves, Box 583, Ardmore, Oklahoma. Phone 6337.

FOR SALE: 3600' 4½" extra hole drill pipe, good for shallow drilling, $.90 per foot. Terms. Melton Supply Company, Box 1360, Seminole, Okla.

FOR SALE—At Oklahoma City: 8—200 HP Bessemer type 10 gas engine compressor units, equipped with 17" x 20" Bessemer or Baash-Ross overhead exhaust power cylinders and 7" or 8" x 20" high and 14" x 20" low compressor cylinders. Contact T. P. Mace, Oklahoma City Warehouse or Cities Service Oil Co., Patridge, Bartlesville, Oklahoma.

FOR SALE at Buffalo, Oklahoma: 2,200' of 9⅝" 36# J-55 Seamless Casing, once run. $2.50 per foot. Deep Rock Oil Corp.—Huitt—Ph. 2-4351—Tulsa.

ROTARIES. Winter-Weis on 50 Ford, Mayhew 1000, Sullivan 2000' capacity. Box H-635, The Oil and Gas Journal, Tulsa, Oklahoma.

WILSON MASTER double drum combination rotary drilling and cleanout rig complete with drawworks, rotary table, traveling equipment, wire lines, 1780' 4½"—14.4# drill pipe, motors and pumps. Good for 2200 ft. Location—North Texas. Price—$22,000.00. Bell Oil & Gas Co., Box 2007, Tulsa, Okla.

EQUIPMENT WANTED

WILL PAY highest prices for used casing, used line pipe, abandoned leases, or other surplus lease equipment. Your idle producing equipment is worth dollars. Green Pipe & Supply Co., Box 1383, Tulsa, Oklahoma.

WILL CONSIDER buying or leasing used seismograph equipment and trucks. Must be in good condition and reasonably priced. Please give full description, prices and present location in first letter. Box H-565, The Oil and Gas Journal, Tulsa, Oklahoma.

HELP WANTED

PETROLEUM GEOLOGIST under 30, with some Illinois Basin experience, to join geological staff of small, expanding, well established independent producing company. Work primarily in Illinois Basin. State age, required starting salary, education, previous experience, and references. Box H-605, The Oil and Gas Journal, Tulsa, Oklahoma.

PETROLEUM ENGINEER with Masters Degree, or Doctor's in Chemical, Mechanical, or Petroleum Engineering, for research and teaching in Reservoir Mechanics and related fields at rapidly growing Southwestern institution. Rank and salary open, twelve months employment possible, consulting work encouraged and available in immediate area. Applications will be kept confidential. Box H-570, The Oil and Gas Journal, Tulsa, Oklahoma.

CHEMICAL ENGINEER

UNUSUAL OPENING

Exceptional opportunity with small well established engineering firm for young chemical engineer—preferably major company or equivalent experience. Good educational background and 3 years or more experience with modern refinery processing and design, especially catalytic cracking and general refinery economics. Activities very diversified in desirable U.S. location. Some but not continuous traveling.

This position offers outstanding opportunity for ambitious and resourceful engineer who can take responsibility for many diverse activities in petroleum refining and chemical fields. Salary commensurate with ability.

Box H-632,
The Oil and Gas Journal,
Tulsa, Oklahoma

WANTED

A PROCESS SUPERINTENDENT
AND
A CHIEF MECHANICAL INSPECTOR

For Two Years Extendable Contract Employment in Baghdad, Iraq, Government Oil Refinery

TAX FREE LIBERAL SALARY WITH FURNISHED MODERN HOUSE

We are seeking men to handle these two important positions:

PROCESS SUPERINTENDENT

Will be in direct charge of operations of a combination crude distillation unit with vis breaking and thermo gas oil cracking. Also gasoline and kerosene treating facilities using caustic and copper chloride process. Must be thoroughly acquainted with topping and cracking operations. Chemical Engineer or equivalent. Must have experience as Process Superintendent or Assistant.

CHIEF MECHANICAL INSPECTOR

Must be capable of establishing oil refinery inspection department. Should be completely familiar with modern inspection methods and equipment. Mechanical Engineer or equivalent. Must have experience as a Refinery Equipment Inspector.

Successful candidates who can pass physical examination will be offered contracts embodying tax free liberal salary with furnished modern house including utilities, first class air transportation for self and family to Baghdad and return, medical care, accident insurance and annual thirty day vacation.

THESE ARE INTERESTING OPPORTUNITIES IN A COMPLETELY NEW MODERN REFINERY.

Qualified applicants should send complete personal and vocational history, compensation received and reasons for changing employment. Also please provide references and any other information you deem pertinent.

Apply by letter to

GENERAL REFINERY MANAGER,
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HELP WANTED

FOREIGN EMPLOYMENT. List of oil companies and drilling contractors showing where to apply for foreign jobs. OIML Co., Box 2603, Tulsa, Okla. $5.00 cash.

PETROLEUM ENGINEER for reservoir section of aggressive independent oil company. Two to five years experience with one year of reservoir work preferred. Location—South Arkansas. Salary commensurate with experience and qualifications. Send detailed personal history and work experience to Box H-604, The Oil and Gas Journal, Tulsa, Oklahoma.

WANTED: Mechanical Engineer to design and develop Line of Mud Pumps for prominent drilling rig manufacturer. Give experience and education. Box H-589, The Oil and Gas Journal, Tulsa, Oklahoma.

Experienced Reservoir Engineer

An experienced, technically trained reservoir engineer is needed for unit operations. Must be graduate petroleum engineer, approximately 35 years old, with several years training in actual field operations and reservoir control. Please send details of training and experience to

BOX H-606,
THE OIL AND GAS JOURNAL,
TULSA, OKLAHOMA

GEOLOGISTS

Attractive staff positions are available with affiliates of Standard Oil Company (New Jersey) in South America and elsewhere. Five - ten years experience required, including several years experience as surface party chief. Assignments will include general regional studies. Positions also available for surface party chiefs for reconnaissance assignments on world-wide basis.

Attractive salaries, liberal annuity and savings programs offered.

Write, giving age, marital status, education and experience in detail.

Box 308-E,
RADIO CITY STATION,
New York 19, N. Y.

REFINERY ENGINEERS
needed in
SOUTH AMERICA

Attractive staff positions are available with affiliates of Standard Oil Company (N.J.) for qualified experienced technical graduates.
MECHANICAL ENGINEERS—Must be thoroughly qualified and experienced design and/or maintenance of refinery or chemical plant equipment including piping, pressure vessels, heat exchangers.
CHEMICAL ENGINEERS and/or CHEMISTS—Assignments in process engineering will include economic studies and preparation of refinery operating programs. CHEMISTS will investigate problems of developing new products and processing methods.
Attractive salaries, liberal annuity and savings program offered.
Write, giving age, marital status, education and details of previous experience.

Box 308-F,
RADIO CITY STATION,
New York 19, N. Y.

HELP WANTED

EXPERIENCED Seismograph Party Chief Wanted by established contract Seismograph Company. Salary commensurate with experience. Give full qualifications and references in letter of reply. Box H-601, The Oil and Gas Journal, Tulsa, Oklahoma.

IMMEDIATE OPENING for process engineer with experience in operation and design of petroleum refining equipment. Refinery located in southwest. TCC catalytic cracking experience desirable. Write giving resume of experience, availability and salary desired. Box H-628, The Oil and Gas Journal, Tulsa, Oklahoma.

FOREIGN EMPLOYMENT
EGYPT—Graduate Engineers with some production experience. Our Fee Paid.
SOUTH AMERICA—Graduate Engineers with some Petroleum experience—Recent Graduate Engineers, no experience required—Tool Pushers, three years experience—Reservoir Engineers, one year's experience—Geologists, must be single. Our Fee Paid. All information confidential. Send resumes to

Chas. J. Loveless Personnel Service
616 South Main Tulsa, Oklahoma

REFINERY
SUPERINTENDENT
40 to 45, about $15,000.
Write, 'phone or call
PARVALE COMPANY
522 Fifth Avenue
New York City

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For positions with Laboratory of major oil company to conduct research and development on drilling, production, and pipe line problems. B.S. or M.S. required. Experience on mechanical or hydraulic equipment and/or control and instrumentation for same desirable. Several needed. Salary open.
Box H-634, The Oil and Gas Journal, Tulsa, Oklahoma

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Rapidly growing, firmly established sales organization in the Southwest has ideal opportunity for person desiring participation in original research. Require MS in Chemical Engineering with minor in organic chemistry. Experience not necessary. Age 22-30.
Applicant must have demonstrated creative ability and capacity for independent research. Work will be with a senior research chemist. Duties will involve synthesis of organic compounds for petroleum production applications and periodic technical assistance of an organic chemical nature.
Please write giving personal background, draft or reserve status, salary desired and qualifications to:

BOX H-633,
THE OIL AND GAS JOURNAL,
TULSA, OKLAHOMA

OPERATING ENGINEER
NEW YORK OFFICE

To assist in supervising office & field and domestic & foreign activities of the Operating Department.

Challenging opportunity for graduate chemical or mechanical engineer with minimum five years petroleum refining experience, preferably with contracting engineering firm.

Please airmail confidential verifiable chronological resume, including salary history, to

PERSONNEL DEPARTMENT
HYDROCARBON RESEARCH, INC.
115 Broadway New York 6, N. Y.

HELP WANTED

PETROLEUM ENGINEERS—Want young engineers with up to four years experience in drilling, production or reservoir work for immediate employment in Rocky Mountain Area. Salary commensurate with experience and training. Box H-603, The Oil and Gas Journal, Tulsa, Oklahoma.

WANTED: Graduate Engineer by independent oil company. Experience in drilling, completion, and workovers in the Illinois Basin. Give details of experience and salary expected. Box H-630, The Oil and Gas Journal, Tulsa, Oklahoma.

OIL AND GAS AUDITOR: New York office needs qualified and experienced auditor for traveling job. Box H-629, The Oil and Gas Journal, Tulsa, Oklahoma.

PETROLEUM ENGINEERS wanted by growing independent producing company in West Texas area. Must have petroleum engineering degree and from two to five years of practical experience in drilling and or production work. Salary will be commensurate with experience. Reply should describe education, experience, marital status, and salary required. Recent photo will be helpful. Interview will be arranged if qualifications meet requirements. All replies will be treated in confidence. Box H-625, The Oil and Gas Journal, Tulsa, Oklahoma.

SITUATIONS WANTED

LANDMAN-ATTORNEY, well qualified, widely experienced. Desires change for more opportunity. Box H-620, The Oil and Gas Journal, Tulsa, Oklahoma.

PETROLEUM ENGINEER. Graduate, 10 years drilling, production, workover, appraisal and management experience desires to relocate. Prefer Mid-Continent or Gulf Coast Area. Box H-593, The Oil and Gas Journal, Tulsa, Oklahoma.

FOREIGN EMPLOYMENT: Presently employed as District Superintendent in Venezuela supervising 300 employees in Drilling, Production, Refinery, Gasoline Plant, Recycling Plant. Complete knowledge of labor and petroleum laws. Graduate Petroleum Engineer. Desire change to Independent or Progressive Company bidding on concessions. Available on short notice. Please write Box 983, Freeport, Texas.

OIL SCOUT, 3½ years Gas and Economics Department, presently scouted 5 months for same major in Rocky Mountain area. BS, MBA in Management, A— average. Single, 31, desires Land Department work in Tulsa or Southwest. Box H-606, The Oil and Gas Journal, Tulsa, Oklahoma.

CH.E., 41, Refining engineering operation and management. 17 years experience oil refining units. Box H-624, The Oil and Gas Journal, Tulsa, Oklahoma.

EXECUTIVE ASSISTANT. Age 35, married. Presently employed large Southwest Texas independent. Ten years' experience as executive secretary, land and pipe line manager. Would consider foreign employment. Box H-623, The Oil and Gas Journal, Tulsa, Oklahoma.

OFFICE MANAGER: Thirteen years with major, last six foreign. Teaching and Engineering backgrounds. Seeking advancement. Married, thirty-seven, can travel, speak Spanish. Best references. Reply Box H-626, The Oil and Gas Journal, Tulsa, Oklahoma.

PETROLEUM ENGINEER. Graduate, 5 years drilling, production, reservoir. Prefer Mid-Continent. Box H-631, The Oil and Gas Journal, Tulsa, Oklahoma.

OIL FORMS

KRAFTBILT FORMS, designed especially for the oil industry, are popular because they are efficient, economical. For plat sheets, well log strips, columnar pads, all production reporting forms, material transfers, truck reports, all administrative forms, ask for new Catalog 1154-K. Ross-Martin Co., P. O. Box 800-A, Tulsa 1, Oklahoma.

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ELIMINATE YOUR MAP-HANDLING PROBLEMS! Simply roll your maps on Kraftbilt All-Plastic Snap-On Map Sticks and hold in place with light-weight resilient plastic clips. Bright colored Index Flags plug in one end of each stick, carry labeled identity and instantly "flag" the map you want. Send for new Catalog 1054-B. Ross-Martin Co., P. O. Box 800-A, Tulsa 1, Oklahoma.

ROYALTIES

ROYALTY COMPANY for sale: With or without Production. Contact A. S. Berry, 817 Wright Bldg., Tulsa, Okla.

JACK EAGLE, Oil Properties, 706 City Nat'l. Bldg., Oklahoma City, Oklahoma. Telephone REgent 6-7027.

LEASE AND DRILLING BLOCKS

WILL SELL 1/16 override royalty in 80 acre oil lease; large Creek County oil field, for $600 to clean out; equip two wells now on lease. Skinner; Red Fork; Bartlesville zones. Two wells have 40 barrels daily allowable. Write for details. Box 181, Cleveland, Okla.

SEE A. L. BOWLES, Box 947, Ada, Okla., for drilling deals and producing royalties if you have the cash for Oil Investments.

Will pay cash instantly for lease (large blocks), royalties, mineral deeds, production. Write fully—P. O. Box 2153, Denver, Colorado.

LEASES ROYALTIES

Producing and Nonproducing
Bought and Sold—Any Area

Inquiries Invited

B. D. BUCKLEY
6436 Delmar Ave., St. Louis, Mo.

OIL PROSPECTOR

AMAZING instructive geophysical literature free on request to oil prospectors and land owners. Write SURFACE OIL SURVEYS, 1414 Electric Bldg., Fort Worth, Texas.

BUSINESS SERVICE

Delaware Corporations formed and serviced. American Guaranty & Trust Company, P. O. Box 487, Wilmington, Delaware

WANTED

SETTLED OIL production wanted by independent operator direct from producer, P. O. Box 852, Oklahoma City, Oklahoma.

BUSINESS COST Reduction and Revenue Increasing Expert Solicits foreign business basis small share of Increased Profits; fixed fee, or salary. Box H-619, The Oil and Gas Journal, Tulsa, Oklahoma.

WANTED—IDEAS

Inventions that are related or can be adapted to the oil industry. We offer capital, technical advice, patent assistance, market research, a manufacturing plant, and a sales outlet; everything to put your invention on the market. Write P. O. Box 1665, Houston 1, Texas.

PETROLEUM AND Natural Gas Engineer, practicing consulting engineering in all phases oil and gas business including writing engineering and reserve reports desires clients on fee or retainer basis. Box 9678, Dallas, Texas.

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After 30 years experience as a strapper with one of the leading pipe line companies in the midwest, I am starting an independent tank strapping company. I am equipped to strap any size tank and can furnish tables if desired.

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NEW OIL COMPANY buying proven oil and gas production with incomes ranging from $25,000.00 to $300,000.00 per month. You are writing directly to company officials. Financial statement will be presented to reliable sellers, principals, and authorized brokers. Box H-586, The Oil and Gas Journal, Tulsa, Oklahoma.

OIL FIELD EQUIPMENT Test location desired. Only independent producers considered with present facilities now handling minimum 100 BPD gas-Condensate or crude oil with about 1000 gas-oil native. Producer guaranteed minimum $750 plus all costs, other attractive benefits. Describe gas-oil separation facilities. Eastern location desired. Box H-622, The Oil and Gas Journal, Tulsa, Oklahoma.

REAL ESTATE

50x150 FT. LOT with building 18x48 ft. at 320 N. Scott, Wichita Falls, Texas, on highway in heart of oil industrial section. Will lease, remodel, or build. Irvin Vogel, 332 Wichita National Bank Bldg., Wichita Falls, Texas.

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Equipment Men

Garrett Names Whittenberg General Sales Manager

D. E. Whittenberg has been named general sales manager of Garrett Oil Tools, Inc. He is a vice president of the company and formerly was manager of its southern sales region. As general sales manager, which is a newly created position in the Garrett organization, Whittenberg will be in charge of the entire sales and service program of the company. Under his direction will fall the company sales organization which operates in Texas, Louisiana, Arkansas, Oklahoma, New Mexico, and the Rocky Mountain area, and the independent agents who represent the company in California, Canada, South America, and the Eastern Hemisphere.

Whittenberg contemplates the formation of specialty divisions within the sales organization to assist in the distribution of Garrett relief valves and Garrett automatic tank-switching systems.

Welex Jet Elects Two to Head Division Posts

W. L. Carwile, Jr., has been elected vice president, Oklahoma division and W. O. Satterwhite has been elected vice

W. L. CARWILE

SATTERWHITE

president, West Texas division of Welex Jet Services, Inc., it has been announced by Ray O. Shaffer, president and chairman of the board of directors of the oil-well service company after a recent meeting of the board of directors in Fort Worth.

Carwile will continue to maintain his office at 308 Midstates Building, Tulsa. He joined Welex in 1948 as assistant manager of the Ardmore, Okla., district and became sales engineer in February 1949. He was named Oklahoma district sales manager in August 1949 and then became Oklahoma division manager in May 1950.

Satterwhite joined Welex as assistant manager and salesman in the Odessa district in 1948. He was promoted to manager of the North Texas district in March 1951, and then named West Texas division manager in October 1951. Before going to work for Welex, he had been associated with a firm manufacturing oil-field supplies in Fort Worth.

Koppers Announces Changes In Tar Products Sales

Four personnel changes in the sales department, Tar Products Division, Koppers Co., Inc., have been announced by J. C. Macon, Jr., division manager of sales.

George H. Persch, who has been assistant district sales manager since 1951, has been named district sales manager, New England district. He succeeds M. D. Gill, who is giving up his managerial duties, but will continue to act as a consultant for the district. Headquarters of the New England sales district are in Boston, Mass.

R. C. Kenan, former assistant district sales manager of the midwestern district, has been named manager, hot-applied-coatings sales. Kenan joined Koppers in 1936.

H. E. Crane, former manager of hot-applied-coatings section, has relinquished his duties to devote full time

to his new position as manager of contract sales in the same section.

General Controls Names Hess Regional Manager

A. E. HESS

A. E. (Bud) Hess, who joined General Controls Co., Glendale, Calif., as a sales engineer in 1944, has been appointed Southwest regional manager with headquarters at Dallas, it has been announced by J. F. Ray, General Controls vice president in charge of sales.

Hess opened the company's Houston branch in 1945 and served there as branch manager before being transferred to Dallas in 1954. Hess formerly worked for Carrier Corp. as a field service engineer and Johnson Service Co. as a sales engineer.

General Controls manufactures automatic-pressure, temperature, level, and flow controls.

Davison to Build Catalyst Plant at Valleyfield

In a move to increase the self-sufficiency of Canada's rapidly expanding petroleum industry, Davison Chemical Co., a division of W. R. Grace & Co. will form a wholly owned Canadian subsidiary, Davison Chemical Co., Ltd., which will build a $6,000,000 plant at Valleyfield, Quebec, Canada, to produce synthetic-fluid, petroleum-cracking catalysts, for which Canada is now entirely dependent upon U. S. sources of supply. The announcement was made recently by Marlin G. Geiger, president of Davison.

Ground for the new plant, which will employ nearly 150 people, has been acquired and engineering and design plans have been prepared by Badger Division of Stone & Webster Engineering Corp. The plant will be able to take care of prospective requirements for synthetic fluid-cracking catalysts of the Canadian petroleum industry for the foreseeable future.

Grace's Davison Division is a major U. S. producer of petroleum-cracking catalysts. The product of the Valleyfield plant will be similar to that made at Davison plants in Baltimore, Cincinnati, and Lake Charles, La.

Work on the new Davison Canadian plant will begin immediately. In addition to the employment provided, the operation will bring other benefits to Canada's economy. All raw materials for the process will come from Canada and the plant will consume large quantities of sodium silicate solution, sulfuric acid, anhydrous ammonia, and hydrated aluminum. Canadian interests are planning construction of a sodium silicate plant adjacent to the new catalyst plant.

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National

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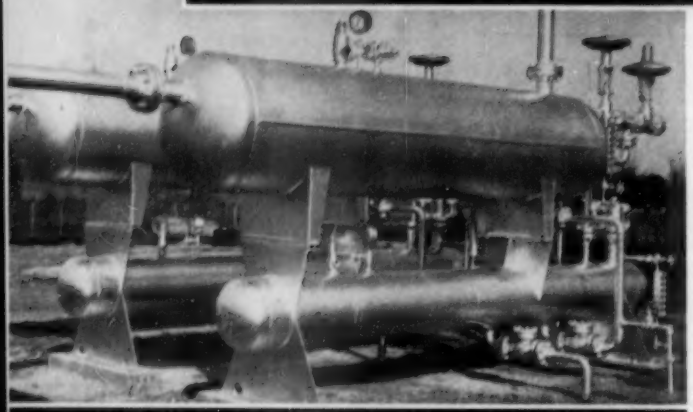

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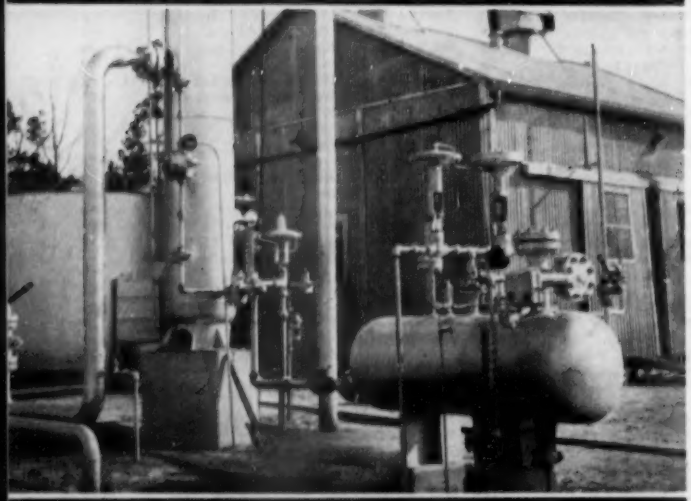
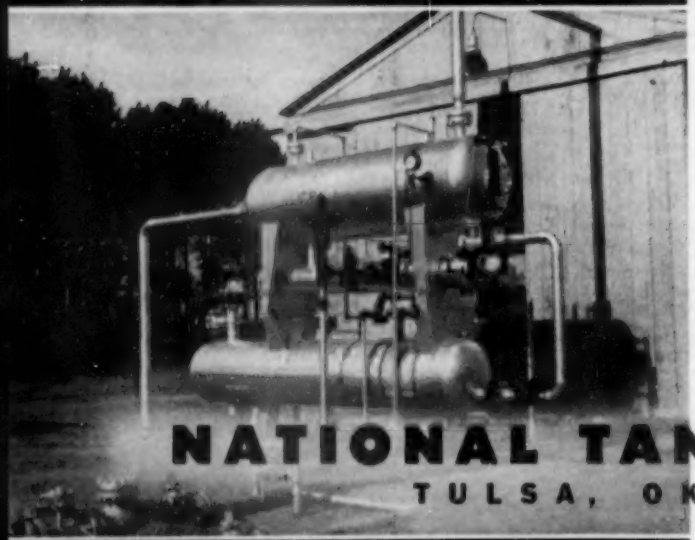


24" 1500 PSI Fluid Booster operating in conjunction with a vertical Oil and Gas Separator and Gas Compressor.



30" 1000 PSI Oil and Gas Separator with 10" Water Leg and 24" 1500 PSI BOOSTER. Fluid is boosted from 800 PSI line into 1350 PSI line.

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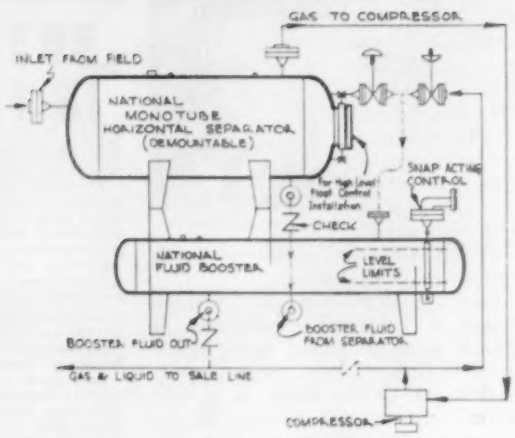

FLOW DIAGRAM

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Usual application is in producing areas where well head pressures have fallen to a less pressure than the existing gas sale line pressure. Here the unit is used in conjunction with a gas compressor.

Typical of this situation is the Carthage Field in East Texas which is supplying gas to a 1050 PSI transmission and gathering line whereas the field producing pressures have fallen to 400-600 PSI.

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The fully automatic unit operates as follows: The well product enters the separator where gas is separated and scrubbed of any entrained liquid. The liquid flows to the booster and gas flows to a compressor. When fluid level builds up in the booster to a prescribed level, a snap acting control opens and closes simultaneously the two valves in the line from the discharge side of the compressor. No gas is vented when double valving is used. Pressure equalizes on the booster with that of the compressor outlet. The liquid then flows from the booster and is commingled with the gas downstream of the compressor and flows then into the sale line.

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